THE UNIVERSITY
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TIME WILL TELL:

Time Perspective in Bipolar Disorder

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Abstract

Background: Time Perspective is an individual difference variable that is believed to underpin 'virtually all aspects of human functioning' (Boniwell & Zimbardo, 2010). Indeed, it has so far predicted a large variety of outcome variables in previous research, including behaviours, attitudes, values, habits and decision-making. However, it has never been tested as a predictor of mood, or in psychiatric disorders. Time perspective theory posits that a balanced time perspective is necessary for healthy functioning. Time Perspective biases, on the other hand, are believed to lead to maladaptive functioning. This thesis investigates whether time perspective does also underpin and predict the most extreme ends of the mood spectrum in bipolar disorder.

Participants: Three online studies were conducted with two samples of adults with bipolar disorders and one sample of adults with no mental health diagnosis.

Setting: All samples were collected online, from across the world.

Objectives: A series of studies investigated various aspects of time perspective theory to establish the relationship between mood and time perspective. Ten research questions were designed to answer questions on time perspective's ability to differentiate and predict mood, and to find out whether or not it functions differently in normal and abnormal mood. It was also established whether time perspective predicts mood states differentially.

Methodology: Regression analyses, MANOVAs, ANOVA and t-tests were performed to answer the research questions.

Results: Our time perspective profile does indeed appear to underpin bipolar mood states. All five time perspectives were able to differentiate between four bipolar mood states. When considered separately, the five time perspectives did appear to predict mood states differentially, i.e. different time perspectives were predictors for separate bipolar mood states. Moreover, time perspective does appear to function significantly different in adults with no mental health diagnosis.

Conclusions: The results of this series o studies suggests that time perspective indeed also underpins mood and can differentiate between normal and abnormal bipolar mood states. Compared to impulsiveness and BIS/BAS sensitivity, time perspective was able to explain more variance in these samples when used as a predictor.

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I. Introduction

1. Background

Imagine a perfect day. You are spending your weekend at the beach with friends and family. The sun is shining and your day has been filled with laughter, swimming, tanning and sharing stories with everyone. You are relaxed and read one of your favourite books. For a second, you remember how much work is waiting for you at the office on Monday. You remember the meeting at work yesterday and the amount of work that you agreed to do in the next few weeks. It will be stressful. But for now, you manage to push the work-related thoughts to the side. For now, work does not matter. You feel at ease. And without knowing it, you are, at this very moment, profoundly influenced by *time perspective*.

Time perspective (TP) measures the amount of the past, present and future in your current thinking. In the beach- scenario above, it helps you consider your past work meeting and your future next week but it also helps you to decide that for now, you prefer to relax, read your book and forget about both the meeting at work and the stressful week ahead. Time perspective theory assumes that our personal temporal preference for guiding our current thinking towards each of the three time frames has a profound influence on our current decision-making, thinking, behaviour and a wide array of other aspects of psychosocial functioning. Consider, for instance, what determines whether you are worrying about next week, even when you are at the beach, or whether you are able to put these thoughts out of your mind until Monday morning. Your personal preferences may help determine this: A future-orientated person aiming for bigger long-term rewards such as a successful career is likely to have difficulties 'switching off' in their leisure time, while the 'hedonist' –type of person may have no trouble staying in the present to relax at all. Past research has successfully identified time perspective as a predictor of many other variables, such as behaviours, attitudes, values, motivations, spirituality, socio-economic status and social life factors. Despite its success as a predictor of such diverse factors, time perspective has virtually never been applied to mental health. This is the gap this PhD aims to fill. More specifically, the present series of three studies examines the clinical utility of the variable time perspective as a predictor of acute mood episodes in bipolar disorder.

How might time perspective be related to your mood? Imagine the beach scenario once more. You have just picked up your book to read and are relaxing it in the sun. Your mobile phone rings. It is the police informing you that a family member has been critically injured in a car

accident. Triggered by your anxiety and worry about your family member, your cognitive focus is likely to narrow instantly: Your focus is now solely on your relative and how to get to them as fast as possible. Yesterday's meeting you
thought about a few minutes ago is now so irrelevant that it is no longer on your mind. The upcoming week is now equally insignificant. While you were able to direct your thoughts towards the past, present and future when you were calm and relaxed, your temporal focus has now completely narrowed to the present situation. The change in your temporal focus appears to go hand in hand with the change in affect you are experiencing. The change can be dramatic and can happen fast. The connection between rapid changes in moods and time perspective is the subject of this PhD.

2. Rationale for this research project

Time perspective (TP) is an individual difference variable that was conceptualized by Philip Zimbardo & John Boyd (1999) in the aftermath of the Stanford Prison Experiment (Zimbardo, Haney, Banks & Jaffe, 1973). It has since been established as a predictor of many psychological variables, and appears to predict a variety of different behaviours, attitudes, personality traits, values and more (Drake, Duncan, Sutherland, Abernethy & Henry, 2008: Baumann & Odum, 2012; Nowack, Milfont & van der Meer, 2013). However, no published study to date has investigated TP as a predictor of mood. This is the gap this PhD research aims to fill. More precisely, it aims to investigate whether or not time perspective can predict mood states in bipolar disorder.

The impetus for researching time perspective in this context of bipolar disorder specifically stems from official observations made at the Stanford Prison Experiment (SPE) conducted by Zimbardo and colleagues in 1971: In their study, all participants involved had underwent rigorous psychological testing prior to taking part and were found to be mentally healthy and stable. Only those students with the most average scores on all psychological assessments were selected (Zimbardo et al., 1973). Yet, only hours into the study, some participants began to display drastic changes in affect and well-being: Almost half of all 'prisoner'-participants showed signs of acute depression and stress and were consequently released (Zimbardo et al., 1973). The observations led to the question of how the participants that had been found to be the most psychologically healthy young men out of all students that had applied to take part could have showed such dramatic changes in their affect in such a short time. Zimbardo attempted to explain these with time perspective: He noted that participants' subjective

temporal perspective had changed at the same time as their affect did. The affected 'prisoner'-participants appeared to have developed a complete focus on their present situation only hours into the study and subsequently developed symptoms of depression and acute stress (Zimbardo & Boyd, 1999). Based on this observation, it was hypothesized that these two variables, temporal perspective and well-being, were likely connected: A narrowing of temporal perspective appeared to go hand in hand with a change in affect. However, this possible relationship was never investigated further and published.

The present thesis begins the investigation of the potential relationship between time perspective and affect by conducting a series of three studies on time perspective and mood states in bipolar disorder. Bipolar disorder specifically was chosen for two reasons: First, it was chosen because of the similarity between the observations of the Stanford Prison Experiment and the nature of bipolar disorder: Both feature relatively sudden and drastic changes in affect. Second, if time perspective does underpin moods, this relationship should arguably be most measurable in the extreme ends of the mood spectrum, mania and depression.

3. Objectives

Following up on Zimbardo & Boyd's (1999) suggestion that time perspective may be closely related to affect, this thesis investigates this potential relationship for the first time. A series of three studies aims to test whether or not time perspective underpins mood states in bipolar disorder and what the nature of this potential relationship is. More specifically, it examines whether or not time perspective can statistically differentiate (hypo-) mania, depression, mixed moods and euthymia, as well as predict these acute mood episodes. As a secondary aim, the link between bipolar mood and time perspective will also be investigated further; e.g. whether or not time perspective may also be a predictor of hypomanic personality which has been identified as a risk factor for developing bipolar disorder (Homish et al., 2013). A thesis argument will be presented that draws on various sources of convergent evidence supporting a potential link between affect and time perspective.

4. Thesis Structure

There are four chapters within the literature review. Given that time perspective has never been applied to bipolar disorder before, the two concepts will be introduced separately first.

Chapter I will introduce time perspective and temporal theory. An overview of the available evidence surrounding the concept will be given and those aspects of temporal theory that will be relevant to affect regulation will be highlighted and discussed. The chapter will conclude with a more detailed discussion as to why time perspective will be applied to bipolar disorder specifically. Chapter II will then describe bipolar disorder and its aetiology. Emphasis is placed on the diagnostic criteria for each mood state given that the thesis argument will aim to link the features of mania, depression and mixed mood states to time perspective. Chapter III will begin to integrate the time perspective and bipolar disorder by discussing theoretical models of bipolar disorder and how time perspective may complement them. The aim is to build a hypothesized model of time perspective in bipolar disorder based on previous work in the field. The chapter will also look at the potential implications of the PhD work at hand by looking at current treatment options for bipolar disorder and how time perspective may add to these if it was relevant to bipolar mood state prediction. Chapter IV then investigates the available evidence on time perspective and how this may relate to bipolar disorder. The synthesis and evaluation of the evidence leads to the research questions and hypothesis for this thesis. These will then be investigated statistically. The methodology will outline the characteristics and sequences of each of the three studies and how they were used to answer the research questions. This will be followed by a presentation and synthesis of the results. These will be discussed in the final part of this thesis, along with the limitations of the studies and potential implications of the results on time perspective as a predictor for bipolar disorder mood states for clinical practice. Each chapter will conclude with a brief summary and transition to the next chapter.

II. Literature Review

5. Chapter I: Time Perspective (TP)

This chapter will introduce the concept of time perspective and temporal theory conceptualized by Zimbardo & Boyd (1999). TP is the central concept in this thesis as it will be tested as a predictor for features of bipolar disorder. As a preparation for this investigation, the goal of this chapter is to outline in detail what time perspective is and what aspects of the surrounding temporal theory may be the most relevant to mental health and optimal functioning. TP is first placed into context by outlining its development and place within psychology. It will then be described in detail and evaluated thoroughly. At the end of this chapter, the impetus for applying TP to bipolar disorder specifically will be outlined.

5.1. Background: Psychology and Time

When we think about the impact time has on our lives, it may seem as though it is a separate entity that exists independently of us. We tend to place our self into a linear continuous stream of events, structured and parcelled into a distinct past, the present moment and an anticipated, imagined future (Tulving & Kim, 2007). However, Einstein's relativity theory (1931; in Zimbardo & Boyd, 1999) questioned this structure and our subjective experience of time as an external phenomenon and instead highlighted the subjective nature of the physical phenomenon of time. Psychologists have since become interested in how exactly we process past, present, and future and what impact parcelling time like this may have on psychological functioning. A lot is known, for example, about the subjective nature of memory reconstruction, a phenomenon demonstrating that time is by no means passively experienced (Dalla Barba, 2000; Klein, 2013). Instead, we are actively involved in creating and re-creating our past in the form of memory encoding and recall as well as in the process by which we attach emotions, attitudes, opinions and other cognitions to each of our memories, the present moment or anticipated events (Klein, 2013). Through mental time travel, we are not only actively able to revisit our past, but also to anticipate events or just to experience the present based on incoming sensations and stimuli (Tulving & Kim, 2007). Because the incoming flow of sensory information we process is constant, we need to shift our attention to re-live past

experiences, envision the future or attend to immediate stimuli. This process can involve very different experiences. For instance, recall can be nostalgic and warm or traumatic and aversive (Zimbardo & Boyd, 1999).

Another aspect of our active participation in the experience of time is our individual preference for the *extent* to which we like to direct our current thoughts to past experiences, anticipated future events or the present moment (Zimbardo & Boyd, 1999). These preferences are reflections of our dominant time perspectives which are believed to have profound consequences for our psychological functioning (Boniwell, 2010) and will be explained in more detail in the following paragraphs.

5.2. Defining Time Perspective: History of TP and issues surrounding its definition

Time perspective is not a new concept. In fact, there have been many attempts to operationalize the rather broad nature of the concept. Philosophical and psychological definitions date back to Kant (1781, in Zimbardo & Boyd, 1999) who defined TP as an innate ability that richly colours the way in which people experience the world. Descartes in the 18th century also stressed the subjective nature of time experience and believed time to be innate, constructed by man (in D'Alessio et al., 2003). Among psychologists, William James (1890) later considered it to be so important to our functioning that he dedicated a whole chapter to time perception in 'Principles of Psychology'. The 'cognitive revolution' within psychology gave time its own place in the motivation of behaviour: Behaviourists believed that actions are instigated by learned associations largely dependent on contingencies, or by wanting to avoid future punishment and gaining reward (in Zimbardo & Boyd, 1999).

Much of the early research efforts around time perspective focused on the consequences of either the future or the present on present decision-making. Future-dominance has been linked to a variety of positive outcomes such as higher economic status, whereas an extreme focus on the present has been linked to many negative life consequences, including mental health problems, crime and addictions (e.g. DeVolder & Lens, 1982; Fraisse, 1963; Nuttin, 1985). Later efforts aimed to capture temporal influences on current experience and often focused on one time frame only. The Future Anxiety Scale (Zaleski, 1996) or the Consideration of Future Consequences Scale (Strathman et al., 1994) are two examples of this. These scales were an improvement from previous, less scientific ways to capture temporal influences that included story-based or graphical methods such as time lines (Zimbardo & Boyd, 1999). These attempts

were problematic as they wrongly assumed that high scores on a future-scale, for example, has an influence on other time frame scores (Apostolidis et al., 2006). Moreover, the past was mostly neglected in early research, which is surprising considering our knowledge of the dramatic consequences past experiences, such as trauma, can have on our present. Later, this narrow TP view was rejected by a key figure in time perception research, Kurt Lewin, who began to recognise the importance of the joined impact of past, present and future on our current behaviour and thinking. Modern day definitions follow his tradition. Lewin defined time perspective as 'the totality of the individual's views of his psychological future and psychological past existing at a given time " (Lewin, 1951, 75). This view was supported by Nuttin who further stressed the importance of the dynamics between all three time frames. He posits that "future and past events have an impact on present behaviour to the extent that they are actually present on the cognitive level of behavioural functioning" (Nuttin, 1985, 54).
Overall, the understanding and agreement on what time perspective constitutes before 1990 was scattered and incoherent so that research surrounding the issue arguably failed to make an impact on psychology at large (Zimbardo & Boyd, 1999). A clear definition of time perspective was still missing, as was an overarching coherent theoretical framework. This changed in the 1990s when Zimbardo & Boyd used the concept of time perspective to explain observations made during the Stanford Prison Experiment regarding the participants' rapid and drastic changes in well-being. Their work has led to the definition of TP that is now used as standard in research and will be discussed next.

5.3. The definition of Time Perspective according to Zimbardo & Boyd (1999)

Time perspective is a measure of how much we like to direct our current thoughts towards the past, present or future. Hornik and Zakay (1996) define the concept as "[...] the relative dominance of past, present or future in a person's thought" (p.385). Time perspective theory was outlined by Zimbardo & Boyd (1999) and comprises five time perspectives. They are believed to be relatively independent of each other, i.e. high scores on one scale do not imply lower scores on another:

- **Past-positive (PPTP)**: A warm and favourable attitude towards one's past that is the essence of nostalgia. A certain comfort drawn from routines and traditions is also implied in this TP. It is a general positive feeling and attitude that individuals source from indulging in pleasant memories.

- **Past- negative (PNTP):** PNTP represents an aversive view of one's past. Since our memory is reconstructive in nature, a past-negative TP may reflect actual negative or traumatic events, or it may be rooted in false recollection of benign, but unpleasant events. It suggests pain, trauma or regret.
- **Present-Hedonistic (PHTP):** This TP represents a fun-seeking, carefree, 'devil-may-care' attitude to life, with little or no consideration for potential consequences of one's behaviour. It is a 'bottom-up' TP, where sensory information is prioritized over weighing up options or reflecting on past experiences.
- **Present-Fatalistic (PFTP):** This is essentially an absence of having a particular temporal orientation. It is the disbelief that one's actions will have a direct impact on one's life. It reflects both a helpless and hopeless attitude in that people with a high PFTP believe that their fate is due to luck, as opposed to their actions.
- **Future (FTP)**: This may be considered the opposite of a present-hedonistic TP as it represents a general orientation towards the future, including an ability to delay reward in order to maximise future outcome, as well as a concern for potential outcomes and consequences of behaviours. It includes a general striving for future goals and rewards.

How dominant each time frame is in our current thinking has unique consequences for our functioning and decision-making. For example, a past-oriented person may be more cautious, based on placing a greater emphasis on negative experiences. A present-oriented person on the other hand may be more spontaneous and may place more emphasis on the current situation than on past experiences (Zimbardo & Boyd, 1999). Each time perspective, apart from FTP, measures our attitudes to the time frame in question as well as the extent to which we reply on each. It is believed that we all rely on each of the five time perspectives, but to varying extents (Zimbardo & Boyd, 1999). Overall, time perspective is believed to be relatively stable over the lifespan. It is learned and shaped by the context in which we grow up and live. Thus is state- but also trait-dependant (Boniwell & Zimbardo, 2004). Various factors determine on which time perspective we draw on at any given moment: Culture, age, religion, socio-economic status and education all influence our TP (Zhang & Howell, 2011; Haghighatgo, Besharat & Zebardast, 2011). However, we may also develop a habitual tendency to activate or rely on a specific time perspective more often than on others. Habitual preferences in time perspective may in turn become dispositional styles and by extension, become part of our personality over time (Zimbardo & Boyd, 1999). We may, for example, develop a predominantly future-oriented type of personality that is often found in Western societies (e.g.

the ‘workaholic type of person, mainly working towards future goals sometimes at the cost of instant gratification). However, we should also be able to flexibly adapt to changing environments and situations. For example, while a future-focus is beneficial in academic and occupational contexts, in our leisure time the same TP would be counterproductive. Thus, healthy individuals’ habitual preferences for specific time perspectives may exist, though they should not be strong enough to make overriding them particularly difficult (Boniwell, 2009). Even though someone is predominantly future-oriented, they should also be capable of adopting a past-orientation should the situation necessitate it (recalling solutions to past events might, for instance, help overcome a difficult situation) and a present orientation (maintaining a social life) to achieve a balance (see Zimbardo & Boyd, 1999). Overall, the ability to switch between time perspectives like this is believed to be key for well-being and optimal functioning (Boniwell & Zimbardo, 2004). A certain cognitive flexibility and broad temporal outlook that includes past, present and future is needed to adapt to varying contexts in life as needed (Zimbardo & Boyd, 1999). This healthy type of time perspective profile believed to underpin optimal functioning is called ‘balanced time perspective’ (BTP; Boniwell & Zimbardo, 2004; Boniwell, 2009) and is in contrast to time perspective biases. Such biases develop when we inflexibly apply one or more time perspectives across contexts, settings and situations. For example, if we apply a future-time perspective across various situations, we are more likely to be academically and professionally successful (Barber et al., 2009) but this may have a negative impact on other aspects of life, such as having enough time for friends.

There are positive and negative aspects to each of the five time perspectives; only the extent to which we rely on each determines whether they are beneficial to us or counterproductive. Extreme scores on any one time perspective subscale of the ZTPI (1999) means an over-reliance on this particular TP and constitutes a bias. Biases, in turn, are believed to be the cause for unhealthy functioning, though the exact nature of consequent maladaptive behaviour has been poorly defined (Boniwell, 2009).

In summary, time perspective can be understood as a cognitive process that helps us not only to partition and categorise our stream of experiences, but it also functions as a kind of ‘cognitive shortcut’ in that it enables us to make decisions more readily based on personal temporal preferences. For instance, future-oriented individuals are likely to make decisions that enable them to gain future rewards at the cost of present enjoyment, while present-hedonistic people will make decisions that will be likely to produce immediate reward. Zimbardo and Boyd (1999) stress how profound the consequences of temporal preferences are for our everyday life: in their more recent work, they evaluate the evidence time perspective research has produced and conclude that time perspective is cognitively underpinning

"virtually all aspects of human experience" (Boniwell & Zimbardo, 2004, 129), permeating and guiding all cognitions. However, time perspective is believed to function on a largely unconscious level. It must be brought to conscious attention to manipulate it. In a diary study reported in Zimbardo & Boyd, for example, past-oriented adults were asked to write about future events for two weeks, which strengthened their future TP and thus balanced their TP profile somewhat. This may be particularly interesting for clinical psychology as time perspective biases can easily be identified with the ZTPI (1999) and, according to this study, could potentially be modified. However, the study's results were limited by the lack of a follow-up assessment and hence it remains unclear whether or not the observed effects can have long-term beneficial effects or whether people are likely to revert to their usual dispositional styles (see Zimbardo & Boyd, 1999). Yet, the fact that time perspective appears to be easily manipulated may provide an opportunity for interventions, should time perspective prove to underpin affect regulation. The Zimbardo Time Perspective Inventory (ZTPI; 1999) was developed by Zimbardo & Boyd to capture our preference for each of the five TP's. It is a 56-item self-report scale and is routinely used in TP research today.

5.4. Summary of the key aspects of Time Perspective and Temporal Theory

- Time perspective is "a cognitive operation that implies both an emotional reaction to imagined time zones (such as future, present or past) and a preference for locating action in some temporal zone" (Lennings, 1996, 72).
- There are five time perspectives: Past-negative, past-positive, present-fatalistic, present hedonistic and future TP. They are believed to be relatively independent of each other but all of us draw on each of them to varying extents.
- We may develop preference for certain TP's. When they are routinely used, they can turn into habitual tendencies, or *cognitive styles*, where they are frequently applied across contexts and situations. Over time, our dominant TP can become dispositional styles or even part of our personality.
- Time perspective preferences are believed to be learned. They are thus heavily influenced by the processes of socialising, modelling, education, cultural and other environmental factors (Seginer, 2003). Nevertheless, it also appears to be affected by situational factors, such as going on vacation, inflation or stress (Beiser, 1987; Zimbardo & Boyd, 1999).

- Time perspectives function on a largely unconscious and automatic level. They may be brought to conscious attention and may then be altered.
- Past research has shown that time perspective underpins attitudes, beliefs, behaviours, personality traits and 'virtually all aspects of human behaviour' (Boniwell & Zimbardo, 2004).
- The standard instrument to measure the five time perspectives is the Zimbardo Time Perspective Inventory (ZTPI, 1999), a 56-item self-report scale.
- Time perspective biases are believed to be detrimental to psychological functioning and well-being. In contrast, a *balanced time perspective* (BTP) profile is believed to be key to psychological health and optimal functioning. Temporal theory did not define this concept further but recent research has begun to define BTP and its consequences.

The main concepts within temporal theory have been explained in this section. Within the original outline of the theory, the ideas of TP biases versus a balanced time perspective profile were stressed as central to well-being and healthy functioning (Zimbardo & Boyd, 1999). The idea of what constitutes a BTP has since been developed further and will now be discussed separately in order to highlight this specific aspect of temporal theory for the coming chapters and the thesis argument.

5.5. Balanced Time Perspective versus Time Perspective biases

Temporal theory posits that TP-biases are detrimental to well-being and a balanced time perspective profile needs to be achieved for optimal functioning (Boniwell & Zimbardo, 2004; Zimbardo & Boyd, 1999). However, the original theory remained vague about what a balanced time perspective (BTP) profile would look like and how it might influence us. Various authors have discussed and defined a balanced time perspective (e.g. Boniwell, 2009; Boniwell & Zimbardo, 2003, 2004; Kazakina, 1999). Webster (2010) define 'balanced time perspective' as "[…] a frequent and equal tendency to think about both one's past and future in positive ways [which] enables individuals to use both the past and future as sources of insight, strength and happiness" (p.112). A BTP allows us to draw on any one TP, depending on what is most appropriate in a given situation. The ability to switch between perspectives also implies cognitive flexibility that may be beneficial in itself (Webster, 2010). There are benefits and costs associated with each time perspective. Based on the context we find ourselves in,

different time perspectives will become more or less appropriate relative to our goals. For example, in an academic context, adopting a future time perspective may be more appropriate than in a time of high stress where a present focus would be more beneficial to focus on one task at a time (Zimbardo & Boyd, 1999).

As discussed above, previous research has often focused on establishing the effects of particular time perspectives on well-being and other variables. Focusing on the future, for example, may bring many positive outcomes such as academic success; reminiscing on the past may increase subjective happiness (Webster et al., 2010), but if one TP starts to dominate our thinking to the extent of minimising or excluding others, the narrow focus is believed to be dysfunctional. Consequences of an extreme FTP, for instance, can include having less time for maintaining a healthy social life. Where one or two time perspectives are overused, they may be inappropriately applied across contexts and become unhealthy according to temporal theory. When such TP-biases form, our cognitions and actions are more likely to become inflexible and thus maladaptive (Zimbardo & Boyd, 1999). Zimbardo & Boyd do not expand on the notion of a 'balanced time perspective' (BTP) and its effects in their seminal paper (1999), but the most recent research efforts centre around what constitutes a BTP, how to measure it and what its effects are. On the forefront of this line of research is Ilona Boniwell. Boniwell & Zimbardo (2004) "strongly suspect the construct of a balanced time perspective will show a consistent correlation with well-being" (p.174). Following this rationale, mental illness should be the manifestation of the opposite of BTP, time perspective biases. This assumption is part of the basic premise of this PhD. If time perspective does underpin moods, abnormal moods such as mania and depression in bipolar disorder should be predictable by time perspective biases, i.e. extreme subscale scores of the ZTPI (1999).

A substantial amount of the latest research on temporal theory has focused on balanced time perspective (BTP). Evidence suggests that BTP is related to subjective well-being. In a study by Drake et al. (2008), participants between 16-83 years with a BTP were significantly happier than those without a BTP. Boniwell et al. (2009) replicated these findings in a British and Russian sample, finding that participants with a BTP scored highest on a range of well-being measures in both samples. Gao (2011) further found a connection between BTW and life satisfaction. And finally, in a large scale study (N=1739) in America, Zhang et al. (2013) related BTP to increased life satisfaction, happiness, positive affect as well as decreased negative affect. However, the methods these studies use to define a balanced time perspective vary. The concept of BTP has been notoriously difficult to operationalize. The point has been raised that a BTP lacks a justifiable criterion thereof (Webster, 2010), which complicates creating a valid and reliable measure of the concept. However, several attempts have been

made to measure BTP (for a review, see Zhang, Howell & Stolarski, 2013). One attempt was made by Drake and colleagues (2008) whose rationale is based on percentages: With their method, individuals scoring below the 33rd percentile on PN and PF, and above it on PP, PH, and F scales are deemed to have a BTP. Drake et al. (2008) found that individuals classifying as having balanced TP's based on these criteria scored significantly higher on subjective happiness and mindfulness than the rest of the sample. This approach to define BTP is often referred to as the 'cut-off-point approach'. However, it is unclear how the cut-off scores were chosen. A further problem with this approach is highlighted by Boniwell et al. (2009). They note that the percentage of participants with a BTP should remain nearly constant in different samples where cut-off scores are used simply because the criterion is based on statistical characteristics of a sample, rather than on any consistent psychological differences between individuals. Presumably because of the convenience of the cut-off scores approach, this is still used widely in well-being research involving TP. The currently dominant view on BTP assumes the following score pattern to be ideal: A combination of high scores on PP (~4.6), moderately high scores on F (~4.00) and moderate scores on PH (~3.90), PN (~1.95) and PF (~1.50) subscales (in Orkibi, 2014; see figure 1). These should not be rigid, but flexibly adaptable to the given context an individual finds themselves in (Zimbardo & Boyd, 2008).

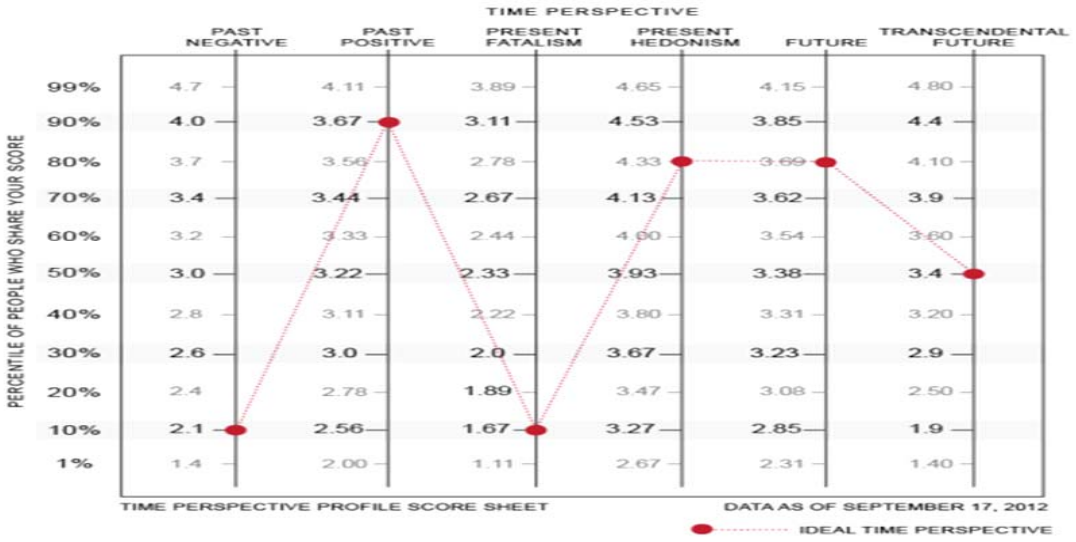

Figure 1: Ideal Time Perspective Values according to Zimbardo (2012)

In a move away from simple ideal subscale scores, Boyd and Zimbardo (2005) furthermore proposed five TP 'profiles'. These are named 'hedonistic' (high PH, low F), future-oriented

(low PH, high F), balanced (high PH, high F), risk-taking (high PH, high PF) and fatalistic (high PF, low PH, low F). These are based on a synthesis of their available research evidence and data they have gathered on their TP website. Boniwell et al (2010) conclude their own study with the assertion that their data supports the utility of these hypothetical TP profiles. Especially the hedonistic and future-oriented pattern described by Boyd & Zimbardo (2005) were associated with the highest levels of well-being. The risk-taking pattern and especially the negative patterns were associated with low well-being levels. However, the associations do not allow for conclusions as to whether or not the relationships are causal and do not allow for making inferences about directionality.

In conclusion, it appears that ZTPI score patterns (i.e. BTP) allow for distinguishing high and low overall well-being better than individual scale scores. For example, future time perspective alone is consistently connected to positive outcomes such as higher socio-economic status and academic success, but it is only weakly to moderately related to overall well-being and subjective happiness (i.e. Webster, 2011). This is not surprising given that the ability to delay rewards may be beneficial to attaining bigger long-term goals, but comes at the cost of short-term enjoyment and minimizes time for maintaining interpersonal relationships. Future time perspective may function in a more long-term-happiness modus but in the short-term it must be accompanied by a degree of present-orientation, i.e. be more balanced. Though it seems to be widely accepted that the concept BTP itself is a prerequisite for well-being (Boniwell & Zimbardo, 2004; Boniwell, 2009; Zimbardo & Boyd, 1999), whereas time perspective biases are expected to lead to aversive functioning, there is currently no clear consensus favouring one approach for measuring BTP.

5.6. Evaluation of Temporal Theory

5.6.1. Limitations of Temporal Theory

There are several limitations to time perspective theory and the concept of TP itself. Most of these are due to ambiguities and unanswered questions that may prove problematic when using TP as a predictor for mood. One example of this is the factor structure of the ZTPI (1999) around which there is still considerable debate. Several authors have argued for the existence of a sixth time perspective. The ZTPI assumes there are five time orientations based on various studies that confirmed this particular structure (Zimbardo & Boyd, 1999). The statistical evidence for the psychometric properties of the ZTPI is mainly demonstrated by a high test-

retest reliability determined through various pilot samples across time and age groups (Fieulaine & Matrinez, 2010; Sircova et al., 2014). However, it has to be noted that much of the original research on time perspective and the ZTPI was done on American university students- a methodology widely used but leading to. Arnett (2008) warns that published research focuses far too narrowly on Americans, who comprise only less than 5% of the world's population. In the context of time perspective, this is particularly concerning as it is believed to be learned and hence heavily influenced by culture, religion and education (Zimbardo & Boyd, 1999). Subsequent research has made a considerable effort to translate the ZTPI and test it in various other cultures (Boniwell & Zimbardo, 2004; Apostolidis et al., 2006; Fieulaine & Matrinez, 2010; Sircova et al., 2014). However, in the process several studies have come to various different conclusions about the factor structure of the ZTPI and number of time perspectives. Each of these studies have either reduced the factors and items (Keough et al., 1999; Fieulaine & Martinez, 2010; Zhang, Howell& Stolarski, 2013; Sircova et al., 2014) or added a sixth factor (Boyd & Zimbardo, 1997; Worrell & Mello, 2007; Carelli, Wilberg & Wilberg, 2011). Even within the group of studies that have found a 6th factor, there is no agreement on what this factor should express. Various versions of what a second future TP should entail have been developed. In their own attempt, Zimbardo & Boyd developed and additional subscale called 'transcendental future' (Boyd & Zimbardo, 1997). This sixth time perspective captures our orientation and attitude towards the time after death. It is highly influenced by religious and philosophical beliefs. Boyd & Zimbardo (1997) argue that thoughts about the imagined time after death may still profoundly influence present behaviour: For example, when soldiers sacrifice themselves, terrorists plan attacks, or individuals commit suicide, the transcendental TP motivates such often religiously driven behaviours. However, transcendental TP is not limited to religion. It captures goals such as reunions with loved ones after death, eternal life, reincarnation, avoidance of eternal damnation, and the elimination of current poverty, pain and suffering. Items believed to represent a transcendental future belief were developed, though the process of this is not described in their seminal paper (Boyd & Zimbardo, 1997). Transcendental TP- items include 'I will be held accountable for my actions on earth when I die', 'Humans possess a soul', and 'death is just a new beginning'. The scale was tested in 1235 Americans, mostly university students, but also people at least 5 years younger or 10 years older than them to extent the age range in the population. These older and younger participants were recruited by the university population which poses a potential threat for internal validity of the responses. Respondents ranged from the age of 13-73 and encompassed 'a wide range of socio-economic backgrounds, ethnic groups and religious beliefs (Boyd & Zimbardo, 1997). Exploratory factor analysis was used in the responses which

included the traditional five time perspectives of the ZTPI, as well as the new transcendental subscale. The statistical analysis found that the transcendental future is indeed a separate time perspective and its items cohere well. Internal reliability of the new scale was a robust 0.87 Cronbach's alpha value and a 0.86 test-retest reliability over a four-week period (Boyd & Zimbardo, 1997). The scale was tested over three years in which the sample was accumulated and these reliability values are reported to be relatively stable over these years. Perhaps because of its equivocal conception and psychometric properties, this sub-scale has arguably not generated much research interest and is usually not included in time perspective studies, unless the research interest is specifically concerned with questions about life after death beliefs.

Another approach to resolving the issue of the single future TP was introduced in a study by Mello & Worell (2006) who divided the future time perspective into 'future positive' (Including items such as "Meeting tomorrow's deadlines and doing other necessary work come before tonight's play") and 'future negative' (including items such as "You can't really plan for the future because things change so much"). A similar approach was adopted in the development of a new Swedish version of the ZTPI, which also made the division between a negative and positive future TP (Carelli, Wiberg & Wiberg, 2011). The Future-negative subscale consists of 8 items, two of which are taken from the original ZTPI future TP scale (items 9 and 18). The Future-positive sale consists of the remaining 11 items of the original future TP scale, reflecting the heavily positive nature of the original future subscale and highlighting its shortcomings at the same time. As with Mello & Worell's (2006) solution of restructuring the ZTPI, factor analysis confirmed this sixth future TP factor as an independent TP, extending the original 56 items to 64. Thus, though each of these different ways of extending the ZTPI are statistically supported, there is disagreement over the nature of the sixth factor.

In yet another attempt, Worrell & Mello (2007) divided the original Future subscale into two factors, with three items assessing 'future planning' (including items such as 'I make lists of things to do'). The positive/negative valence- additions to the future time perspective are useful in that they are sensible on both theoretical and logical grounds. The original ZTPI-56 structure includes items that are close to the newly developed 'Future-Positive' items that aim to assess the capacity for delayed reward (Zimbardo & Boyd, 1999). However, the traditional single 'future' scale is not able to make the distinction between a fatalistic and an optimistic attitude towards the future that is possible, for example, in present TP. This distinction could potentially be very valuable, for example in the study of depression where hopelessness towards the future can play a crucial role. This should thus be distinguishable from an

optimistic view of one's future in order to accommodate tendencies underpinning depression or low mood.

In summary, there are at least three clashing opinions on what the 6th time perspective and second future TP should entail: A positive/negative distinction, one homogenous future factor, or a transcendental future subscale. The various suggestions are highlighted here as all of these suggestions have been validated with exploratory and confirmatory factor analyses (see Orkibi, 2014) and appear to have credit on psychometric grounds (Worrell & Mello, 2007)). This is thus worth keeping in mind when interpreting results obtained with the original ZTPI (1999). It needs to be considered that it may not optimally, or comprehensively, capture all aspects of our experience, and particularly those that are relevant to this thesis e.g. low moods.

A second possibility is the factor structure of a time perspective profile may depend on the population, which may be particularly important to keep in mind as the ZTPI (1999) has been developed with a student population originally (Zimbardo & Boyd, 1999). In fact, in addition to the debate over the factor structure of time perspective profiles, there have also been arguments around the psychometric properties of the ZTPI (1999). Five attempts have been made to shorten the ZTPI while retaining or improving its psychometric properties. The shortest version is the French ZTPI (Fieulaine & Martinez, 2010) that consists of a total of 15 items, three for each of its dimensions. The psychometric properties of this new scale were below that of the original ZTPI, with Cronbach's Alpha-values are ranging from 0.41 for the PF subscale to 0.66 for the PN subscale. Furthermore, the scale was developed using a relatively small French college student sample and thus reliability and validity of the measure were just above average. A lack of studies subsequently using the scale further limits available data on the scale's reliability.

Another 15-item version was created in a larger American adult sample with a mean age between 23 and 31 but the reliability properties were not reported (Zhang, Howell & Boerman, 2013). A 22-item version with an even larger American sample and more diverse age range was created by Keough et al. (1999). It consists of one future factor and one present factor only, aiming to investigate the interplay between those two time frames and substance use. Cronbach's alpha values were around 0.7 for both scales. Another Italian three-factor structure (D'Alessio, Guarino et al., 2003) was further featured in an Italian study, as well as a 25-item version in an Australian community sample supporting a 5 factor structure (Homewood et al., 2010). Psychometric properties for both the Italian and Australian were satisfactory, with Cronbach's Alpha values ranging from 0.59 to 0.79.

The most recent attempt to improve the ZTPI is the ZTPI-36 (Sircova et al., 2014) with retained five-factor structure. It was developed using samples from 24 countries, making its

external reliability and compactness its major strength. Its developers claimed that this version should be 'the gold standard for further research on time perspective' (Sircova et al., 2014, 9). However, this measure was subsequently tested externally with three large diverse samples from different countries. These examiners used exploratory structural equation modelling (ESEM) as an alternative to the flawed standard confirmatory factor analyses traditionally used in the assessment of the ZTPI versions. Their findings revealed several problems with the ZTPI-36 and casts doubt on its utility and structural validity (McKay et al., 2015). The confirmatory factor analyses in all three countries yielded mixed results. ESEM analyses yielded better results but was still only acceptable in one of the samples, even with the most liberal cut-off scores (McKay et al., 2015).

A further limitation of the ZTPI (1999) and its traditional factor structure relates to internal validity issues. Boniwell et al. (2010) point out that the ZTPI claims to measure temporal orientation, defined as both our attitudes towards each time frame and the dominance of each in our current thinking and decision-making processes. However, instead each TP appears to measure different domains of functioning: Future TP measures the skill to delay rewards to work towards bigger rewards in the future, the past TP measures sentiments attached to memories and how much we value stability and traditions as well as an underlying level of anxiety, and the present TP's are measuring an attitude to life, beyond just measuring the present. Boniwell et al. (2010) propose the distinction between three aspects of TP that the ZTPI appears to encompass:

- Temporal locus: Our tendency to locate ourselves predominantly in the future, past or present
- Valence: A positive or negative attitude to each of the time frames
- Personal strategies: Strategies we use to relate our behaviour to our preferred time frame (i.e. enjoying the present versus living for the future)

It is not clear to which extent each TP measures all aspects or what the implications are for the uneven distribution of underlying aspects in each TP (Boniwell, 2010). For example, future TP appears to fail to capture the valence aspect, whereas the past TP seems to measure all of the above aspects. Further ambiguities are discussed below.

A third issue apart from unclear psychometric properties of the ZTPI, there are further general ambiguities within time perspective theory. Most of these are regarding the broad nature of the concept of time perspective. For example, time perspective theory (Zimbardo & Body, 1999) does not explain when we override our preferences for certain time perspectives. This

may have important consequences for time perspective as a predictor of immediate behaviours as opposed to behavioural tendencies. An example scenario could be a situation in which a predominantly future-oriented person is driving to an appointment they are late for. As a default, habitual response, the future-oriented person would be expected not to speed, fearing the consequences of breaking the speed limit: a potential speeding ticket. On the other hand, a person with an extreme present-focus would be expected to speed in order to get to the appointment, regardless of the consequences. Temporal theory posits that context triggers the activation of relevant time perspectives, i.e. it is not just a matter of personal preferences, habits and tendencies (Zimbardo & Boyd, 1999). There are multiple questions arising from this scenario: Which TP gets activated in the speeding-example: the TP triggered by the situation ('I are late, I have to hurry') or the TP triggered by our usual, habitual default responses? What decides which TP gets activated? What overrides our usual tendencies and under what circumstances? Temporal theory is, for example, unable to predict why and when someone acts 'out of character', i.e. overrides their usual response tendencies (compare Boniwell, 2010). It may be able to explain this in retrospect (i.e. context triggered a certain TP or preferred TP was used) but it cannot predict these circumstances. And as a consequence, there are several problems with predictions made base on TP: For example, a predominantly future-oriented person would be expected to act based on future reward. But what exactly constitutes the bigger reward: getting to the appointment in time or not getting a speeding ticket? And to complicate matters further: What do the scores actually tell us in terms of short-term predictions? If someone has a past-positive TP score of 3.56, what does this score actually tell us in terms of predicting immediate actions (compare Worrell, 2006)? Time perspective may be used in correlational research and predictions can then be made based on probabilities. However, it is questionable how useful the scores are for specific short-term predictions.

A fourth issue that temporal theory is vague on is how stable time perspective profiles really are. It is assumed that they are learned and relatively stable, albeit changeable, long term, once brought to conscious attention (Zimbardo & Boyd, 1999). This would mean that time perspective is perhaps less likely to underlie moods and emotions that are subject to many external influences and fluctuations throughout any given period of time. However, the core observation made during the Stanford Prison experiment (Zimbardo et al., 1973) explains the sudden change in mood and emotional stability with time perspective. And it is assumed that time perspectives must be flexible as different TP's are activated in different contexts, i.e. they are changing quite frequently and healthy functioning is in fact believed to be underpinned by switching time perspectives relatively often in response to situational demands (Boniwell et al., 2010). It is hence unclear how stable time perspectives really are, when they change, when

habitual responses can be overwritten and by what mechanism this happens. This limits the practical use for time perspective if its main use is to predict behaviour and cognitions or moods. Especially in clinical practice, it would be questionable how relevant it is to measure someone's current time perspective profile. If it is subject to change and fluctuations, there would be little use in knowing the current TP-scores. If it is relatively stable, as is assumed in temporal theory, it could be used to change general maladaptive response tendencies.

5.6.1.1. Limitations of the concepts of 'Time Perspective Biases' versus 'Balanced Time Perspective' (BTP)

The concepts of time perspective biases versus balanced time perspectives are central to this thesis as they are believed to be underpinning maladaptive and healthy functioning respectively (Zimbardo & Boyd, 1999). They are therefore discussed separately in this section. TP theory states that the key to positive, optimal functioning is a balance in all time perspectives, though this balance is poorly defined as of yet. Consequently, what exactly constitutes a *bias* is equally vague. It is clear that extreme scores on one time perspective theory are believed to be maladaptive (Zimbardo & Boyd, 1999). In one of their own studies reported in Zimbardo & Boyd (1999), they operationalize TP biases by participants scoring above the 95th percentile in one time perspective but below the 95th percentile in the other four TP's. However, it remains unclear if this is the only profile that constitutes a time perspective bias. For example, whether or not it would equally constitute a bias if scores on one scale were 'extreme' but the other four TP's would not be below the 95th percentile, but just mid-range. And would it be a bias if two TP's were 'extreme'? Is it possible to have two or even three biases?

Another perhaps paradoxical notion is the concept of 'ideal time perspective scores', which can be found on the time paradox-website of Zimbardo (2012). Ideal scores were calculated based on averages and research findings. However, the ideal TP for the past-negative subscale is 2.1, on a scale from 1-5. 2.1 could be considered close to being an extreme score- yet it is considered, within a full time perspective profile, as ideal (Zimbardo, 2012). On theoretical grounds, this makes sense: Having an extremely high focus on negative events in the past would certainly be maladaptive and a lesser focus on such aspects of the past should be leading to better well-being. However, this is, and is not, what temporal theory predicts. It posits both that a balance is necessary, and this balance includes high scores on some scales and low on

others. On the other hand, scores that are too extreme are believed to be lead to dysfunction (Zimbardo & Boyd, 1999). This is an aspect of the theory that lacks clarity.

A further concept lacking a clear definition is the concept of 'balanced time perspective'. This is believed to comprise a certain combination of high and low scores of the individual time perspectives which are believed to be underpinning healthy functioning and psychological well-being (Zimbardo & Boyd, 1999; Boniwell & Zimbardo, 2004). However, there are different ways of measuring what a balanced time perspective is. One of those techniques involves the use of cut-off scores (i.e. Drake et al., 2008) and concrete ideal time perspective scores have been suggested on Zimbardo's website (2012). These ideal scores are surprisingly not close to the mode on each subscale, as one would perhaps expect. Instead, some of the ideal scores are actually fairly close to the extreme ends of the Likert scale they are being measured on. For example, the ideal score for a past-negative TP is 2.1 on a scale from 1-5. This could, however, also be considered a fairly extreme score. If 2.1 on a scale from 1-5 is not considered an extreme score and bias, but is actually considered 'ideal', it is not clear what really classes as a 'bias' as opposed to part of a healthy balance (Drake et al., 2008). High scores on any subscale should indicate a bias, i.e. an overuse or extreme focus on that particular TP. Yet, the ideal score for a past-positive subscale is believed to be 3.67 (Zimbardo & Boyd, 2012), again a fairly high or extreme score that should constitute a bias, and hence be considered unhealthy, but instead, it is part of the ideal, health balance. Temporal theory may thus benefit from clarifying whether or not 'extreme scores' on subscales are always dysfunctional, given that it appears to be the direction that matters. Additionally, the ideal time perspective scores published on Zimbardo's website (2012) appear to have been calculated based on data gathered in their studies but it is unclear if that is the case and how exactly the ideal TP scores have been calculated. Moreover, the sample characteristics on which these scores are based are unclear and thus it is impossible to gauge their external reliability.

A last issue that lacks clarity within BTP is that temporal theory assumes that flexibility is key to positive functioning, so that we may adapt flexibly to situational demands (Boniwell & Zimbardo, 2004). Thus, both is assumed: Flexibility to switch is key, yet our preferences for using certain TP's are relatively stable (Zimbardo & Boyd, 1999). The question arises whether it is not the *flexibility* that is really what is important to positive functioning and well-being, as opposed to *specific scores*. This is something temporal theory does not explore. It is also not clear what helps us switch between dominant time perspectives, what decides what time frame we ultimately base a decision on at any given moment. It is possible, for example, that executive function is responsible for the switching mechanism and change of focus or perspective (compare Hamilton et al., 2011). Cognitive flexibility has been linked to several

positive outcomes and is generally impaired in individuals with bipolar disorder. It may be possible that it is actually the ability to switch between time perspectives flexibly that is decisive, not a balance of TP's in terms of ideal scores.

5.6.2. Strengths of Time Perspective Theory

Time perspective is a unique concept in that it is believed to cognitively underpin all aspects of human behaviour (Boniwell & Zimbardo, 2004). And in fact, there is a lot of evidence supporting this statement. Time perspective has shown to predict a vast array of different behaviours, attitudes, habits, aspects of well-being, academic success, socio-economic status and more (Baumann & Odum, 2012; Boniwell & Zimbardo, 2004; Cretu, 2013; Drake et al., 2008; Daugherty & Brase, 2010; Laghi et al, 2009; Smith et al, 2012; Wittmann et al., 2014; Zahng & Howell, 2010, 2011; Zimbardo, Keough & Boyd, 1999). In the context of bipolar disorder in particular, it has a clear advantage over traditional vulnerability approaches trying to determine stressful life events, dysfunctional attitudes or other stressors believed to have the potential to trigger a mood episode: the difficulty with singling out specific events, cognitions or attitudes as predictors is that their impact on mood is not as straightforward as we might believe. For example, research has shown that even such positive events as winning a million dollars does not necessarily impact on our happiness (Brickman, Coates & Janoff-Bulman, 1978). In other words, circumstances often only explain a small part of the variance in subjective well-being (e.g. Campbell, Converse & Rodgers, 1976; Kamman, 1982). It is therefore clear that to understand the impact of life events on judgements of well-being, it is insufficient to consider only the quality of these events (Strack, Schwarz & Gschneidinger, 1985). Time perspective, instead, considers the *underlying* cognitive tendencies that underpin *all* of these variables, ranging from dysfunctional attitudes to behaviours and coping styles. The concept has so far managed to produce a vast amount of evidence with practical applications. Criterion validity of the concept is high with specific subscale scores consistently being linked to real-world outcomes, such as future time perspective predicting high SAT scores and other social outcomes (Mischel, Shoda & Rodriguez, 1989).

Before the development of the Zimbardo Time Perspective Inventory, research in the field was scattered and non-cumulative (Zimbardo & Boyd, 1999). Time perspective was not appropriately operationalized and various scales to measure TP existed. However, these methods (for a review, see Orbiki, 2014) were flawed in that some focused only on specific time perspectives and others had inherent problems with their scoring methods. These included

time lines and other visual approaches. Since the conception of the ZTPI, time perspective is appropriately defined, operationalised and can be measured more reliably. As a consequence, the research interest time perspective has generated since the 1990s has escalated. The ZTPI consistently has shown to have robust psychometric properties (e.g. Drake et al., 2008) and has been translated into various language (Apostolidis et al., 2006; Fieulaine & Martinez, 2010), stimulating more research interest in different countries and showing time perspective's relevance and influence across cultures. The concept has particular potential for clinical psychology in that time perspective profile can easily be measured, underpins various cognitions relevant to well-being, and appears to be relatively easily changeable. In a diary study reported in Zimbardo & Boyd (1999), clinically depressed participants were given the task to write about positive events in their future for two weeks. Their future TP scores increased significantly during that time period. Moreover, temporal theory provides a theoretical framework for not only predicting various behaviours that are relevant to health care and well-being, but also for defining what constitutes optimal functioning, how to measure and attain it. A balanced time perspective is believed to underpin such positive, optimal functioning, and it is operationalized giving concrete ideal TP scores (Boniwell & Zimbardo, 2004; Drake et al., 2008; Zimbardo, 2012a). Time perspective profiles can then be measured for an individual, compared against the optimum values and adjusted.

5.7. Why apply time perspective to bipolar disorder?

The inspiration for this PhD research comes from a small paragraph in Zimbardo & Boyd's (1999) seminal paper on the construction of the Zimbardo Time Perspective Inventory (ZTPI). In it, the authors explain that the impetus for the development of a time perspective measure came from Zimbardo's observations made during the Stanford Prison Experiment (Zimbardo & Boyd, 1999). In particular, one of the most curious outcomes of the SPE was the fact that nearly half of the psychologically healthy young men that entered the study appeared to have turned into depressed and anxious individuals only hours into the study (Zimbardo et al., 1973). In an attempt to explain these relatively sudden and drastic changes in affect, Zimbardo & Boyd used (and re-defined) time perspective. In their seminal time perspective paper, they highlight the "dramatic alterations in TP that occurred during the week-long Stanford Prison Experiment" (Zimbardo & Boyd, 1999, 1273), which appeared to be occurring at the same time as the changes in mental health and stability of some participants. Yet, the idea of a co-

occurrence of dramatic changes in affect and time perspective is not explored further. Following the publication of the ZTPI, no subsequent research directly explored the idea that time perspective may be connected to affect regulation, as suggested by Zimbardo & Boyd's (1999).

This thesis is the first attempt to investigate whether or not time perspective could be a predictor of the extreme ends of the mood spectrum, mania and depression, as well as other acute affective mood states in bipolar disorder, as is speculated by Zimbardo and Boyd (1999).

The following paragraphs will give a more detailed overview of the events in the Stanford Prison Experiment that led to the observed changes in mood and time perspective of participants, based on the account of the study described in Zimbardo et al. (1973).

The connection between the participants' drastic and The SPE took place at Stanford University in August of 1971. College students from all over the United States had answered an ad in a local Connecticut newspaper. 70 of these potential candidates for the study were invited to take a battery of psychological tests and were interviewed to assess their psychological health. The 24 male students that were found to be "the most normal, average, and healthy on all dimensions" (Zimbardo, 1996) were selected to participate in the study. They were randomly assigned to be either a guard or a prisoner in the mock prison that was set up in the basement of the Stanford University. The guards were told to maintain law and order but to not use their billy clubs as weapons and to realise that the study was to be terminated if any of the prisoners escaped. No further instructions on how to behave were given to either group (Zimbardo et al., 1973).

The first day passed without incident. On day two, however, the prisoners started a rebellion against the coercive rules that the prison guards had established and locked themselves into their cells, insulted and taunted the guards. Zimbardo informed the guards that they would have to manage this crisis on their own and so they reacted by punishing the prisoners: Blankets and clothes were taken away, prisoners were told to strip naked, put in solitary confinement for hours, deprived of food and forced to do meaningless activities like jumping jacks. These tactics were steadily intensified and with it, the pressure on the prisoners rose (Zimbardo et al., 1973).

Only 36 hours into the Stanford Prison Experiment, the first prisoner was released due to becoming mentally unstable (Zimbardo & Boyd, 1999). He had led the rebellion against the guards. After his efforts were unsuccessful, he commented that the mock prison was "a real prison run by psychologists instead of run by the state" (Zimbardo et al., 1996). Zimbardo (2012) later used this statement to illustrate how this participant's time perspective became increasingly narrow and finally he focused almost entirely on the present, to the point of a

neglect of the past (e.g. remembering his shared past with other prisoners) and future (e.g. planning to withdraw from the study). Zimbardo and Boyd (1999, 1273) described this change as participants going 'from relatively future-oriented college students to being totally immersed prisoners of the present moment'. This observation was later substituted by this particular prisoner who described what the situation was like for him in an interview: "There is no way to describe how I felt; I just felt totally hopeless" (Zimbardo & Boyd, 2012). Importantly, this drastic change from having relatively balanced time perspectives to a complete focus on one time perspective, present-fatalistic in the case of this prisoner), was accompanied by changes in his emotional stability. When he was placed in solitary confinement and listened to the other prisoners who were made to chant "Prisoner 815 is bad" repeatedly, he suffered a mental breakdown. He began to crying, scream, curse, and displayed "irrational actions that seemed pathological" (Zimbardo et al., 1996). He reportedly refused an offer to leave the experiment in order to see a doctor (Zimbardo et al., 1973). On being offered to leave, the participant refused, wanting to go back to show the other prisoners that he was not a 'bad prisoner'. Zimbardo reacted by telling the participant "You are not 816. You are [name] and my name is Dr. Zimbardo. I am a psychologist and this is not a real prison. This is just an experiment, and those are students, not prisoners, just like you. Let's go". Records state that '816' stopped crying suddenly, looked at Zimbardo "like a small child awakened from a nightmare" (Zimbardo, 2012b) and got up to leave the experiment." Once more, this may demonstrate his extreme focus on the present situation.

Time perspective theory may explain this sudden recovery with Zimbardo's words that broadened this participant's view beyond the current situation and reminded the 'prisoner' that he was not, in fact, stuck in the present.

During the next three days, three more prisoners were released for similar behavioural displays. A fifth participant even showed a physiological reaction and broke out in a full body rash after his appeal for parole was denied (Zimbardo et al., 1973). On day 6, the decision was made by the researchers to terminate the study due to the deterioration of the psychological health of participants. Nearly half of the young men that had been assessed and found to be 'normal', well-adjusted and psychologically stable before the start of the experiment displayed signs of serious and pathologically stress, anxiety and depression (Zimbardo et al., 1973).

In the aftermath of this study the question arose as to how participants that had been found to be psychologically healthy and stable prior to the experiment could have changed so dramatically and quickly in terms of emotional stability and mood state (Zimbardo & Boyd, 1999). Zimbardo explains the changes on an emotional level with the concurrent "dramatic alteration in TP" (Zimbardo, Haney, Banks & Jaffe, 1973, 1273) described above, mostly a

complete focus on the present. On reflection, Zimbardo noted how the subjective time sense of the prisoner-participants changed during the course of the study: They went from being "relatively future oriented college students to being totally immersed prisoners of the present moment, without concern for their shared past or any interest in the future after they were released" (Zimbardo & Boyd, 1999, 1275). This thesis tests for the first time whether or not time perspective may indeed by linked to mood regulation, as has been previously speculated by Zimbardo and colleagues (1973; 1999).

5.8. Summary of chapter I

Chapter I introduced the concept of time perspective and temporal theory outlined by Zimbardo and Boyd (1999). A focus was placed on the notion of time perspective biases versus balanced time perspective profiles as these are believed to be central to adaptive or maladaptive psychological functioning. TP theory posits that biases are maladaptive and may lead to poor adaptive skills of the individual to their environment (Zimbardo & Boyd, 1999). A balanced time perspective, by contrast, is believed to be needed for healthy functioning (Boniwell et al., 2010). Temporal theory then was evaluated in this chapter. Many ambiguities accompany temporal theory at present which may limit TP's ability to predict mood precisely and short-term. However, time perspective also has several strengths and advantages over traditionally used predictors of bipolar disorder mood states given that it appears to predict a large variety of psychological variables and may thus also predict mood. It is also relatively straight-forward to measure, and potentially to change (Zimbardo & Boyd, 1999). It may thus have potential to be used in psychological therapy. The final section of this chapter aimed to explain why time perspective is being applied to bipolar disorder specifically in this thesis. The disorder and its main features will now be discussed in chapter II as a foundation for the thesis argument which will create a model of time perspective in bipolar disorder.

6. Chapter II:
Bipolar Disorder

The previous chapter introduced time perspective as a central concept that will be tested in the context of bipolar disorder for the first time in this thesis. Given that there are no published studies that link both concepts so far, chapter II will focus on introducing bipolar disorder and the features of the condition that will be relevant to the thesis argument. The following sections will introduce features of bipolar disorder that are relevant for building a theoretical model of how time perspective may work in this condition in chapter III.

6.1. General overview and epidemiology of Bipolar Disorder

Bipolar disorder is a severe affective disorder marked by recurring episodes of (hypo-) mania, depression and mixed moods, intermitted by periods of relatively normal functioning in remission (Pini et al., 2005). These acute mood episodes differ considerably in length, severity and the type of functional impairment they cause. The disorder overall is associated with considerable treatment needs, usually life-long, as well as great social and economic burden for the individual, their families and society (Abood et al., 2002; Wittchen et al., 2003). The term 'bipolar disorder' encompasses a variety of subtypes and classifications that may present with various degrees of symptoms and express themselves in different phenotypes of the condition. These include cyclothymia and hypomania that are considered less severe forms of mania, and rapid cycling bipolar disorder where mood swings occur more frequently than in other subtypes (Pini et al., 2005). The two most prevalent forms of the illness are bipolar disorder I and II (APA, 2013). The former requires the presence or history of at least one manic or mixed episode. These patients will usually also experience major depressive episodes though these are not required for a diagnosis of bipolar type I. Bipolar type II differs from type I only in that there are no manic episodes, but the less severe form of these phases, i.e. hypomania (APA, 2013). Hypomanic episodes are shorter in duration (at least 3 days instead of 7) and are causing less impairment in social and occupational settings and are usually not needing hospitalizations. There are also no psychotic features in hypomanic episodes (APA, 2013).

The prevalence-estimates of Bipolar Disorder vary considerably. Bebbington & Ramana (1995) for example suggested about 0.5% of the population in the UK has bipolar disorder at

the time, which equated to roughly 297.000 people living with the condition per year. Various sources estimate that no more than 1% of the general population has the condition, though others estimate figures 'up to at least 5%' (Akiskal et al., 2000). More specific are the available data in terms of the considerable socio-economic bipolar disorders pose on the British National Health Service. The annual cost to the NHS of managing bipolar disorder is estimated to be as high as £199 million, 35% of which are due to hospital treatment. £53.2 million was estimated to be the cost of bipolar disorder to community mental health (CMHT) teams and £28.9 million to day hospital attendances (das Gupta & Guest, 2002).

Besides these direct costs, there are many other sources that are associated with the condition. Psychiatric co-morbidity is extremely common in bipolar disorder. At least 60% of patients have an additional diagnosis, the most common being alcohol or drug misuse disorder (Brady & Sonne, 1995). High rates of heart disease and smoking are also common and further increase morbidity and mortality. Bipolar disorder is so highly morbid that it is causing more disability than cancer, epilepsy and Alzheimer disease (Merikangas et al., 2011). An estimated 46% of diagnosed individuals are unemployed (Hill et al., 1996 in das Guptas & Guest, 2002) which compares to only 3% of the general UK population that was in unemployment in 1999/2000 (das Guptas & Guest, 2002). Therefore, the indirect cost of unemployment among British citizens with bipolar disorder are around £1510 million. Further indirect costs are associated with absenteeism at work (£152 million), suicide, carers, and more. The total societal cost of bipolar disorder in the UK was totalled at £2055 million per year, or approximately £6919 per person with the condition (das Guptas & Guest, 2002). While BP-I appears to be more prevalent in men, an equal proportion of males and females are being diagnosed with BP-II (Goodwin & Jamison, 1990). The next sections will discuss the current DSM-5 diagnostic criteria for bipolar mood states in more detail.

6.2. Diagnostic Criteria of Bipolar Disorder in the DSM-5: Current Diagnostic Criteria and Bipolar Symptoms according to the DSM-5

6.2.1. Bipolar Disorder I

6.2.1.1. (Hypo-) Mania

A manic episode is a period of abnormal functioning, as defined by the criteria below, that lasts for at least one week (APA, 2013). It is characteristically marked by unusually and

persistently elevated or irritable mood, accompanied by at least three symptoms (or four symptoms when the mood is only irritable) outlined in criterion B. Often, these periods are marked by easily identifiable euphoric and excessively cheerful feelings (APA, 2013). However, the predominant mood may also be irritable, especially when the individual's wishes have been denied or if substance abuse is included. Rapid shifts in mood over brief periods may occur (APA, 2013). During mania, the individual may engage in multiple projects, often initiated hastily and with little knowledge of the topic involved. The increased activity may last until early hours of the day as the need for sleep decreases. Grandiosity and uncritical, inflated self-esteem reach delusional proportions (Criterion B; APA, 2013). Speech can be rapid, with little attention to what is said, and without regard for communicating thoughts to others. It may be theatrical, including jokes and irrelevancies that become more important than the message the individual wants to convey (Johnson, 2005). If the patient is more irritable, communication can include complaints, hostile comments or angry triads (APA, 2013). Thoughts often race faster than they can be expressed and speech can be faster shifting from one topic to the next. In extreme cases, speech is disorganised or incoherent as well as distressful to the individual when thoughts become too complex to express. This naturally hinders effective communication with others and hence can severely impact social life (Levy & Manove, 2012). However, increased goal-directed activity can consist of excessive planning and participation in multiple activities, including social, sexual, occupational, political, or religious activities. Often, manic individuals will show increased sociability, for instance making new acquaintances or seeking contact with old friends or even strangers (Levy & Manove, 2012). While efforts to be more social are higher than normal, these efforts are not always successful due to aforementioned problems with communication, but also due to an accompanying domineering and intrusive attitude and demanding nature within these interactions. Some individuals write excessive letters on many different topics to public figures, friends or the media (Calabrese et al., 2004). The expansive mood, excessive optimism and grandiosity often lead to the engagement in reckless behaviours, such as spending sprees, foolish investments, sexual promiscuity, with little regard for the high possibility of these activities ending with painful consequences (Levy & Manove, 2012). Taken together, all these symptoms lead to severe impairment in social or occupational settings and can require hospitalization to prevent self-harm or harm to others. This includes financial losses, illegal activities, loss of employment and self-injuries. The symptoms of mania/ hypomania and diagnostic criteria are summed up in the tables 1+2 below.

Table 1: DSM-5 criteria for mania

Criteria	Manic Symptoms	
A	A period of at least one week where the following symptoms are present for most of every day: Abnormally and persistently elevated, expansive or irritable mood and increased goal-directed activity or energy. Mood change must be accompanied by increased activity or energy levels	
B	Three or more of the following criteria are present during the period described in A. If the mood is only irritable, at least 4 symptoms must be present for the duration of the episode.	• Inflated self-esteem or grandiosity • Decreased need for sleep • More talkative than usual/ pressure of speech • Flight of ideas/ experience of racing thoughts • Distractibility as reported or observed. Attention is easily drawn to irrelevant external stimuli. • Increase in goal-directed activity (socially/work/school/sexually) or psychomotor agitation (i.e. purposeless, non-goal-directed activity) • Excessive involvement in activities that have high potential for painful consequences (e.g. engaging in spending sprees, sexual indiscretions or risky business investments)
C	The mood disturbance is sufficiently severe to cause impairment at work or in a social context. It may require hospitalization to prevent self-harm or harm to others. There may be psychotic features.	
D	The episode is not due to physiological effects, i.e. as a consequence of substance use or another medical condition. This includes antidepressant treatment: If mood symptoms persist on a fully syndromal level after the treatment has stopped, it is sufficient for a manic episode, and hence Bipolar I, diagnosis.	

Table 2: DSM-5 criteria for hypomania

Criteria	Hypomanic Symptoms	
A	At least 4 consecutive days of abnormally elevated, expansive or irritable mood for most of the day, nearly every day.	
B	Three or more of manic symptoms (see B criteria for Mania) are present for the duration of the hypomanic episode (Four or more symptoms when mood is only irritable)	See B criteria for mania
C	The change in functioning witnessed in the individual is clearly uncharacteristic of him or her	
D	The disturbance and change in functioning are observable by others	
E	The episode is not severe enough to cause marked impairment or require hospitalization. If there are any psychotic features, the episode is manic instead.	
F	The episode is not due to the effects of substance use, including antidepressant treatment. If symptoms persist after antidepressant use at a fully syndromal level, this is evidence for a (hypo-)manic episode.	

6.3. Bipolar Depression

The diagnosis of a major depressive episode requires the presence of five out of nine diagnostic symptoms with a minimum duration of two weeks, representing a change from previous functioning. The criteria are summed up in table 3 below.

Table 3: DSM-5 criteria for Bipolar Depression

Criteria	**Depression Symptoms**	
A	Five or more of the following symptoms have been present during a 2 week-period. These are in contrast to previous functioning. At least one of the symptoms must be *either* • Depressed Mood *or* • Loss of interest or pleasure The symptoms must not be attributable to other medical conditions.	Nearly every day, reported or observed: • Depressed Mood for most of the day • Significantly diminished interest or pleasure in all, or nearly all, activities for most of the day • Significant weight loss or weight gain or decrease in appetite • Insomnia or hypersomnia • Psychomotor agitation or retardation *observed by others,* i.e. restlessness or being slowed down • Fatigue or loss of energy • Feelings of worthlessness or excessive inappropriate guilt (possibly delusional) • Difficulty concentrating or thinking, indecisiveness • Recurrent thoughts of death, recurrent suicidal ideation without a specific plan
B	Symptoms cause significant distress or impairment in social, occupational or other areas of functioning	
C	The episode is not attributable to the effects of substance use or another medical conditioning.	

Note: Major Depressive Symptoms are common in Bipolar I. The symptoms may be caused by an event where a depressed response seems appropriate (i.e. loss of a significant person), but the presence of a major depressive episode, as diagnosed by criteria A-C, should still be considered. Clinical judgement, cultural factors and the individual's history should be applied and considered (APA, 2013).

6.4. Bipolar Disorder II

To be diagnosed with Bipolar II, the individual must have experienced at least one major depressive episode lasting at least 2 weeks, as well as at least one hypomanic episode lasting at least 4 days (APA, 2013). During those days, symptoms must be present for most of the days, nearly every day and represent a significant difference from normal functioning of the individual. If any manic episode or psychosis occurs, the diagnosis automatically changes to the lifetime diagnosis of Bipolar I (APA, 2013). A hypomanic episode causing significant impairment would likely qualify as a manic episode.

Compared to the depressive and manic episodes in Bipolar I, acute phases in bipolar II are often lengthier or frequent, though less impairing than Bipolar II (Johnson, 2005). Approximately 5-15% of affected individuals experience four or more mood episodes in one year. A rapid cycling pattern is associated with poorer prognosis (Tundo et al., 2013). Another 5-15% will eventually develop manic symptoms, changing their diagnosis to Bipolar I Disorder (Cruz et al., 2008). Depressive episodes are generally more common in bipolar II and their occurrences often increased with age. An 'associated feature' in bipolar II is impulsivity which may contribute to developing substance use disorders and suicide attempts. Suicide risk is nevertheless roughly equal in bipolar I and II (Levy & Manove, 2012). In addition, the occurrence of the hypomanic and depressive episodes must not be better explained by other disorders including schizoaffective disorder, schizophrenia, schizophreniform disorder, delusional disorder, the effects of substance use or other medical conditions (APA, 2013). Lastly, for a diagnosis of Bipolar II, the symptoms of depression or the unpredictable nature of frequent alternations between periods of depression and hypomania cause significant distress or impairment in important areas of functioning, such as in social or occupational settings (APA, 2013).

6.5. Changes to Diagnostic Criteria in the DSM-5

Between the DSM-IV and the recent publication of the DSM-5 (APA, 2013), there have been various suggestions for extending bipolar criteria to include more subtypes and symptoms to the diagnoses. For example, researchers called for expanding the diagnosis to include childhood presentations that may look different than the traditional adult presentations of the condition (Biederman et al., 2010), relaxing the criteria for the lengths of mood episodes in order to include more sub-threshold types of bipolar disorder (Angst et al, 1998, 2013) and

generally include more subtypes (Akiskal, 1996). The recent publication of the DSM- 5 (American Psychiatric Association, 2013) has some of these changes official.
The definitions of both manic and depressive episodes have radically been revised in the DSM-5 (APA, 2013). Angst et al. (2010) suggested that with the DSM-IV, only roughly half the patients that were treated for bipolar disorder could also be diagnosed. This was partly due to the fact that some sub-threshold diagnoses were not specifically listed in the DSM-IV leading to patients receiving the catch-all diagnosis of 'not otherwise specified (NOS)'. The DSM-5 (APA, 2013) now includes sub-threshold syndromes, which is hoped to encourage further research and allows for a more dimensional view of the illness.

6.6. Bipolar Disorder "with mixed features"

The DSM-IV diagnosis of 'mixed episode' required that individuals met full criteria for both mania and a major depressive episode. This has been removed in the DSM-5 (APA, 2013) and been replaced with a new specifier, named "with mixed features". It can be applied to episodes of mania or hypomania when depressive features are present and vice versa.

6.7. Other Specified Bipolar and related disorders

The DSM-5 (APA, 2013) allows the specification of particular conditions for other specified related disorders. This includes a categorisation for individuals with a past history of a major depressive disorder who meet all criteria for hypomania except the duration-criterion. Another categorization is when individuals do not meet enough symptoms for hypomania for the full bipolar II syndrome, but the duration of their symptoms is sufficient at 4 days or more.

6.7.1. (Hypo-) Mania

There are three major changes that have an impact on both diagnoses, mania and hypomania:

- *Gate questions (Criterion A)*

Mood changes must now be accompanied by persistently increased activity or energy levels. This makes the diagnosis more restrictive 'for no apparent reason' (Angst, 2013) and in fact

contradicts evidence that indicates any one of the three entry symptoms is valid on its own (e.g. Angst et al., 2012)

- *Reduction in the number of exclusion criteria*
- *Vigorous effort to operationalize bipolar sub-threshold syndromes that were previously labelled NOS*

In the DSM-5 (APA, 2013), sub-threshold conditions may now be diagnosed, such as hypomania lasting only three days instead of four. The implication of those changes are that the diagnosis of Bipolar II will likely in the future be given to about twice as many patients as it has until now (Angst, 2013).

6.8. Limitations of the DSM-5 Diagnostic Criteria

The publication of the DSM-5 (American Psychiatric Association, 2013) was accompanied by much criticism. The British Psychological Society (2011) in particular issued a statement in which it distanced itself from the DSM-5, stating that it was clearly based on 'more concerns than plaudits'. An often discussed point of criticism the BPS also elaborated on is the fact that such categorical diagnoses are often based on social norms and rely heavily on the judgement of the clinician (Angst, 2007). This is precisely the type of relationship between service-users and clinicians that is largely rejected within the NHS that aims for individually tailored, patient-centred care that is evidence-based, transparent and free of societal values. The BPS (2011) made a primary specific recommendation which encouraged the use of description-based formulations that are based on the clients' accounts of their difficulties as they experience them. These should start with their descriptions of symptoms and should then be met by the clinician's expertise in psychological frameworks that are pertinent to the described symptoms and recovery from such. The debate around the DSM and the categorical versus dimensional views of mental illness is beyond the scope of this PhD. The current research merely uses the DSM-5 (APA, 2013) criteria for acute bipolar disorder mood episodes as a frame of reference and shared language to describe the psychopathology and symptoms that are likely to be involved in the different presentations of bipolar disorder in order to link these characteristics to time perspective evidence.

6.9. Aetiology of Bipolar Disorder

As with most psychiatric disorders, the precise aetiology of Bipolar Disorder is unknown but is believed to be subject to the influences of both genetic vulnerabilities and several environmental risk factors. These will be explored in the next two sections.

6.9.1. Genetic Factors

Adoption studies, as well as twin and family studies have determined that genetics play a major role in the vulnerability to bipolar disorder (Craddock & Jones, 1999). Estimates of hereditability are in the region of 90%, which is among the highest of any psychiatric disorder (Kieseppa et al., 2004). The risk of one sibling developing bipolar disorder if the other already has a diagnosis is between 5% and 10% and in monozygotic twins it is around 60%, providing evidence for a strong genetic link.

The personality traits of sociotropy (high need for approval) and neuroticism (excessive reactivity to stress) have been strongly associated with bipolar disorder, and current evidence suggests that at least part of the genetic risk for mood disorders takes the form of inheritance of these character traits and cognitive styles (Smith et al., 2012). Smith et al. (2012) suggest that it is likely that the combination of various genes is responsible for the development of the disease in most cases. Several promising regions of the genome have been implicated to date (e.g. Badner & Gershon, 2002).

6.9.2. Environmental Factors

Around 40% individuals with a monozygotic twin that has Bipolar disorder do not develop the illness, suggesting that environmental factors are at also of major importance in the aetiology of Bipolar Disorder. A number of environmental factors have been identified that appear to increase the risk for developing the disorder. These include early history variables such as a history of obstetric complications, prolonged parental separation, neglect and physical or sexual abuse (Smith et al., 2012).

Later risk factors are exposure to drugs, physical illness and adverse life events, which are particularly important for depressive episodes (Smith et al. 2012). It is assumed that early

environmental factors probably act as major determinants of illness risk, whereas later risk factors act only as sufficient stressors in predisposed individuals.

6.10. Summary of chapter II

Chapter II introduced the main features of bipolar disorder with a focus on diagnostic criteria of the mood episodes given that this thesis will attempt to predict these with time perspective. The diagnostic criteria of each episode were considered in detail given that the thesis argument in the following chapters will attempt to demonstrate that the features of each mood episode show a degree of overlap with certain time perspective features and previous research. This chapter is also the foundation for chapter III which will attempt to integrate time perspective theory and models of bipolar disorder.

7. Chapter III:
Towards an integrated model of Time Perspective and Bipolar Disorder

Chapter I and II discussed the concepts of time perspective and bipolar disorder separately in preparation for chapter III which aims to build a hypothesised model on how time perspective may function within BD. Based on this hypothesised model, the research questions will be constructed after a review of the evidence in chapter IV. The previous chapter ended with the outline of the aetiology of bipolar disorder. Chapter III will now start by reviewing a general model of the course of bipolar disorder that brings together evidence on various aspects of the aetiology that has been reviewed by Levy & Manove (2012). This will be followed up with a closer look at psychological theory around the specific mechanisms leading to either (hypo-) mania or depression. Bipolar theory around this will be reviewed in order to then suggest a combined model of temporal theory and bipolar theory that may be able to explain how time perspective could improve predictions about what factors may lead to acute mood episodes. This will be the foundation for the hypotheses that will be suggested for this thesis in chapter IV.

7.1. Modelling Bipolar Disorder: Debates and approaches

Modelling bipolar disorder is particularly challenging due to the nature of the disorder, but also due to the several debates around fundamental aspects of the condition that are still ongoing. One of these relates to the unanswered question of whether bipolar disorder symptoms are best understood within a categorical or dimensional model. There is growing evidence that the spectrum approach with its dimensional nature is a real alternative to the traditional Kraeplinian dichotomy of unipolar versus bipolar dichotomy (Angst, 2007). Some authors suggest that a significant part of the available literature severely overemphasize the link between bipolar and unipolar mood disorders (Peters & Büchel, 2010). However, most evidence points towards a continuous distribution of depressive to hypo-manic and manic symptomatology, and from normal to pathological (Judd & Akiskal, 2003; Judd et al., 2012; Merikangas et al, 2011). At present, the bipolar spectrum is used in 2 complementary senses, a spectrum of severity which embraces psychotic and non-psychotic major and minor forms of bipolar disorder (incl. Dysthymia, recurrent brief and minor depression), cyclothymic disorders, and hypomania. The second is a mood spectrum that considers mania and depression

on the level of minor and major mood disorders. In other words, both ways of looking at a spectrum look at either normal to pathological, or from unipolar to bipolar. Hypomania is on the spectrum towards abnormal mood, between normal elated mood and mania. Normal personality dimensions are often used to to provide the framework for identifying risk factors for developing abnormal mood, i.e. mania (Clark, 2006). Unipolar disorders such as major depression have been repeatedly linked to the Big Five personality traits (Goldberg, 1993). The emerging literature suggests that high levels of neuroticism/negative emotionality and extraversion/positive emotionality appear to increase a person's risk to develop unipolar depression (Klein, Durbin & Shankman, 2009). In the context of bipolar disorder, similar efforts have been made to identify risk factors but have yielded less consistent results. On the continuum from normal to abnormal mood, individuals who are more energetic, gregarious and driven to pursue ambitious goals are believed to be more vulnerable to developing mania (Akiskal & Akiskal, 2005; Johnson, 2005) and thus bipolar disorder I. Their premorbid functioning may be recognised by sub-threshold manic symptoms, such as irritability, mood swings, entitlement, risk-taking and impulsivity (Johnson, 2005; Meyerr & Hautzinger, 2003). These hypothesized prodromes are conceptually linked to the Big Five traits, which in turn have been linked to the five time perspectives (Zimbardo & Boyd, 1999). In an attempt to capture the full personality trait profile that would capture increased risk to developing bipolar disorder, the Hypomanic Personality Scale (HPS; Eckblad & Chapman, 1986) was developed, measuring hyperactive, ambitious, and exhibitionistic behaviours, as well as elated mood and racing thoughts. On the mood spectrum, this personality profile is believed to reflect an increased risk to developing mania (Swann et al., 2007). The concept of hypermanic personality can be accommodated within the BIS/BAS system. HPS scores have been linked to the Reward Responsiveness subscale of the BIS/BAS scale (Swann et al, 2007).

It has been argued that this dimensional approach to conceptualising symptoms is too simplistic as it appears to imply that mania is on one end of the mood spectrum and hence is the height of happiness, in contrast to the other pole, depression (Johnson, 2005). However, mood episodes are rarely clear-cut. Manic presentations can, for instance, have elements of elated mood and irritability at the same time. Uni-dimensional approaches to bipolar disorder considering symptoms on one dimension from depressed ‘low to elevated mood’ have difficulty accounting for these seemingly different states of mind. It thus appears as though there is an element missing from the uni-dimensional approach that would be able to account for such mixed presentations within the same mood episode.

Time perspective as a cognitive variable may be accommodated within the dimensional models of bipolar disorder more so than within categorical models given that the five TP’s

themselves are all measured on a continuum from less to more intense. It is believed that we all possess each of the five TP's, but rely on each to varying degrees (Zimbardo & Boyd, 1999). It is therefore not a matter of categories but extent. TP theory suggests that preferred TP's are relatively stable over time, but that TP's should also be flexible enough to change and adjust to situational demands. In general, an individual may therefore be, for instance, predominantly future-oriented but may rely more on their past- or present-TP in certain circumstances (Zimbardo & Body, 1999). TP theory therefore shares some overlap with the dimensional models of TP and may equally be able to explain mixed presentations, should it also underpin and predict mood. It is possible, for example, that a dominant TP underpins the relevant current bipolar mood episode but a second TP may be linked to further symptoms that would not necessarily be consistent with the dimensional view. The five time perspectives are believed to be connected, although they are thought to operate independently of each other. For instance, a manic person may experience the elated mood that would be expected on that end of the spectrum but a second TP may account for symptoms not necessarily associated with a purely elated state of mind. Cognitive individuals difference variables like TP may thus potentially underpin and predict the symptoms within mood episodes on a spectrum from normal to abnormal mood, and potentially the spectrum of intensity of symptoms.

Within these general approaches to bipolar mood, various theories have been developed to explain what factors influence how mood shifts from normal to abnormal (Levy & Manove, 2012). Various factors impact on the development of mood episodes and a recent review has attempted to integrate the available evidence on these variables into one model. This integrated model will now be discussed, followed by a discussion of specific psychological models attempting to explain the development of bipolar mood episodes. The goal is to discuss how time perspective may add to the the model this thesis is built on.

7.2. An integrated model of the aetiology of Bipolar Disorder (Levy & Manove, 2012)

In order to understand the aetiology of bipolar disorder, psychological models attempt to integrate various strands of research on biological, psychological and social factors that may influence the course of the disorder. There is general agreement that there are biological and genetic vulnerability factors that make individuals more prone to developing acute symptoms (Levy & Manove, 2012). However, it appears to be external stressors that interact with these

to trigger mood episodes. Both factors need to be considered to model bipolar disorder accurately.

The genetic contribution to a bipolar disorder-vulnerability profile may take the form of abnormal circuitry of mood-regulating systems in the brain or in the expression of personality traits that are ineffective at coping with environmental stressors (Levy & Manove, 2012). Especially early developmental adverse events such as birth complications or prenatal infections may create biological vulnerabilities such as a hyperfunctioning hypothalamic-pituitary-adrenal (HPA) axis which may respond abnormally to later stressors in life (Zobel et al., 2004). This malfunction can in turn have adverse effects on the neural circuitry responsible for mood regulation and bring about acute mood episodes. In a recent review of available evidence on various genetic and environmental factors of aetiology of bipolar disorder, Levy & Manove (2012) synthesized this evidence and visualized its course (figure 2).

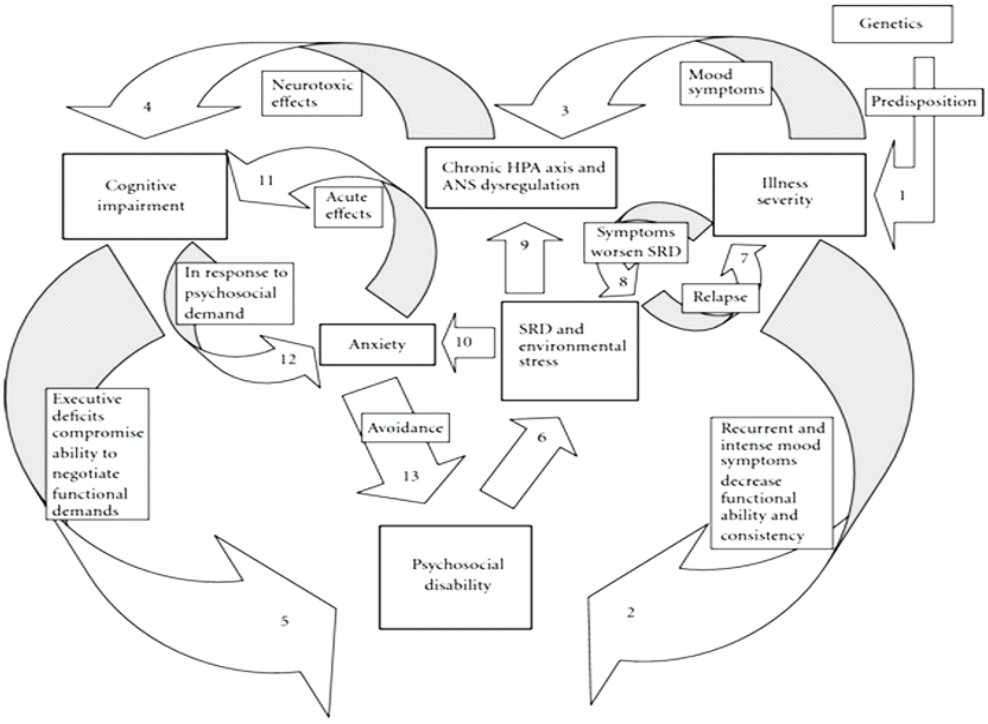

Figure 2: Integrated model of bipolar disorder according to Levy & Manove (2012)

Even though the graphic shows the interplay between factors that are likely to dynamically interact, there is some underlying progressive linear pattern in the course of the disorder as well (Levy & Manove, 2012). This course can become a downward spiral, reflecting

increasing impairment, and may best be explained in terms of various (interacting) pathways that have the potential to trap affected individuals in a recurrent cycle that accelerates psychosocial decline (APA, 2013).

Based on evidence summed up in Levy & Manove (2012), it is likely that a strong genetic component influences the onset, severity and progression of the illness. However, once mood symptoms are experienced, these have a direct impact on psycho-social functioning. If mood episodes reoccur, this increases stress that may become chronic. The effect stress has on neural networks leads to cognitive decline over time. Cognitive impairment, and especially executive dysfunction, diminish the ability to meet everyday life demands. This, in turn, creates further disruption to social rhythm and increases environmental stress (Levy & Manove, 2012). Psychosocial stress, such as our reaction to adverse events, can aggravate the expression of episodes within the model above (figure 2), which leads to a more severe course of the illness. The intensifying of the symptoms and the recurrence further debilitate the individual in terms of psychosocial functioning and social rhythm (APA, 2013). Eventually, the created stress contributes to the chronic hyper-arousal of the autonomic nervous system and the HPA axis. Repeated failures in social and work life are more likely to be experienced and anxiety related to psychosocial demands will increase. Anxiety also has acute effects on cognitive functioning during new challenges (i.e. in terms of attention, getting tasks started and decision-making) and this further compromises attentional control and executive functioning (Levy & Manove, 2012). Cognitive impairments experienced, failures and the resulting anxiety may then lead to avoidance of psychosocial demands and situations in an attempt to stay stable. However, this maintains or worsens both anxiety and functioning in a downward spiral in this model. It is possible that time perspective is part of the cognitive impairment experienced by affected individuals. As an individual difference variable believed to underpin decision-making, it is possible that TP biases may underpin certain maladaptive behaviours following the cognitive exploration and selection of action. Time perspective biases may underpin certain maladaptive behavioural response pattern that may then contribute to the downward spiral outlined by Levy & Manove (2012) by influencing and manipulating the individual's environment. Hence, the importance of early intervention to stop progressing psychological, social, and cognitive impairment in bipolar disorder cannot be overestimated (Perry et al., 2013). Time perspective could be of potential use in adjunctive treatments to traditional interventions. If genetic vulnerabilities are believed to underpin the development of bipolar disorder and external factors (e.g. stressful events) and internal factors (e.g. dysfunctional attitudes) are believed to trigger acute episodes, the question remains what actually predicts whether a manic, depressive or mixed mood episode develops. This is the question time perspective may help

to answer. The following section will look at bipolar disorder theory on how bipolar mood episodes may develop and the way time perspective may add to the existing models. Based on this understanding, it may then be possible to evaluate how useful time perspective could be in psychological interventions for bipolar disorder.

7.3. Psychological models of Bipolar Disorder and Time Perspective

Several psychological theories have attempted to explain the onset and maintenance of bipolar disorder symptoms and acute mood episodes. The most widely-used framework contemporary theories are based on is the diathesis-stress model which emphasises the role of the interaction between biological vulnerabilities and life stressors (Brietzke et al., 2012). While this approach is mostly descriptive, it has directed research by reminding us of the importance of the interaction between the individual and their environment. Time perspective provides insight into this precise dynamic in that it measures how individuals approach, process and interpret their environment. It therefore gives insight into the point of interaction between the person and their surroundings. While theories of bipolar disorder are centred around this individual-environment-link, they provide little concrete ways of pinpointing and capturing this particular interaction; arguably one of the biggest drawback of diathesis-stress models (Brietzke et al., 2012). The most dominant psychological models in bipolar disorder research are now going to be discussed and it will be considered whether or not time perspective may be a valuable addition to each.

The arguably most dominant model in the UK used for the psychological treatment of bipolar disorder is the cognitive-behavioural approach (Nivoli et al., 2011). It assumes that cognition is linked to behaviour, emotion and physiological response (e.g. Beck, 1961). The links between the four systems are believed to be learned and to become stronger over time but can also be unlearned. This is a similarity to time perspective, which is believed to be learned and maintained by habitual use over time (Zimbardo & Boyd, 1999). TP is functioning at a largely subconscious, automatic level until it is brought to conscious attention at which point it may be altered. The implication for time perspective and the stress-diathesis idea within the cognitive-behavioural model is as follows: The way we process life events cognitively is connected to our emotions and actions. Time perspective provides a way in which we may measure or monitor the way events are processed and how consequent action may be selected or influenced. Where TP biases develop and they become applied across situations inflexibly, the emotional response and behavioural outcomes should

be equally engrained. Time Perspective by definition is a cognitive response style that can, over time and with repeated use, turn into dispositional style (Zimbardo & Boyd, 1999). This idea is in line with the cognitive-behavioural model that posits that response patterns are learned and strengthened over time (e.g. Beck, 1961). Time perspective is a set of mental processes that produce a disposition or readiness to respond in a particular manner by orientating decision-making processes towards the past, present or future. This can be both adaptive or maladaptive, depending on the flexibility with which each TP is used. Where biases exist, these dispositional styles can be maladaptive (Boniwell, 2004). If time perspective and mood were indeed linked, TP would be a cognitive vulnerability in bipolar disorder. The important advantage of TP is, however, that TP biases may be modified once made available to conscious attention (Zimbardo & Boyd, 1999). It could thus be a valuable tool in terms of monitoring cognitive response styles and a valuable target in terms of breaking engrained links between the three systems.

Research around the diathesis-stress model has linked specific environmental factors to increased sensitivity (Levy & Manove, 2012), in line with the cognitive-behavioural model and its four systems, stressing the link between the individual and their environment. This evidence, in turn, is compatible with both cognitive-behavioural theory and TP theory. For example, the level of social support (Miklowitz et al., 1988), lifestyle and sleep regularity (Wehr, Sack & Rosenthal, 1987) have been linked to relapse and onset of new bipolar mood episodes. Both of these factors are also linked to specific TP's: A past-negative TP bias has been shown to be correlated with having fewer friends and romantic relationships (Zimbardo & Boyd, 1999) and more importantly, this TP is linked to less communication between the individual and their families about stressful experiences. This is a concrete example of how a specific TP bias could be linked to what we know from diathesis-stress model research, i.e. fewer social contacts appear to be accompanied by a past-negative TP and cognitive style which is associated with higher risk for relapse into new bipolar mood episodes (Miklowitz et al., 1988).

It is important to acknowledge that there are considerable limitations to the current models in that they appear to simplify clinical presentations. For example, present-hedonistic TP has been linked to more gregarious personalities and thus more social contacts in a study by Holman & Zimbardo (1999). This was also linked to increased opportunities of participants to discuss stressful events with others and should therefore be linked to decreased chances of a relapse into acute mood episodes. A present TP bias should therefore have a positive influence in that it could potentially buffer the effects of adverse life events via the increased social contacts. However, a dominant present-hedonistic TP should also shares great overlap

with a manic mood episode and thus this time perspective may equally lead to, or contribute to the development of (hypo-)manic symptoms. Given that the same TP bias could lead to positive and negative outcomes, there may be various mediating factors at work that determine whether a certain TP becomes adaptive (e.g. leads to more social contacts and thus buffers mood episodes) or maladaptive (e.g. leads to the characteristics that are defining features of a manic episode). A further point is that such simplified models is that bipolar moods are rarely unified and the experience of bipolar mood episodes are multi-facetted. Thus, a single TP bias may be inappropriate to characterise episodes on their own.

A second approach to bipolar disorder is based on the interpersonal and social rhythm theory (IPSRT). It combines IPT work on unipolar depression with the circadian rhythm model in bipolar disorder (Nivoli et al., 2011). IPT works in three phases in therapy: First, it focuses on assessment and formulation that assesses a person's social network and support. Second, it selects from four goals for the intervention: Interpersonal role disputes (e.g. conflict at work or marriage); role transitions (e.g. moving to adulthood or retirement); grief or interpersonal deficits in establishing and maintaining relationships. In the termination phase, the last stage of therapy, the goals are being tackled and worked towards. This type of therapy is short-term and has a here-and-now focus (Nivoli et al., 2011).

Social rhythms and mood are closely monitored in IPSRT and any circumstances that could interrupt social rhythm and interactions. The goal is to make sure social rhythms are regular and include other people, especially when early warning signs of a mood episode or prodromes are identified (Frank et al., 1999). An early warning sign for bipolar (hypo-)mania could be an increased present-hedonistic TP score and a warning sign for depression may be a decreased future TP and/or an increase in PNTP. A major weakness of IPSRT is that is only loosely maps onto scientific evidence as it was developed based on clinician's judgements of what works for them in practice, as opposed to research (Miklowitz et al., 2000). Because of the lack of clear theoretical underpinnings, it is also difficult to test hypotheses for this model (Miklowitz et al., 2000). In terms of social rhythm and circadian rhythm, it is unclear how important each is for bipolar symptoms and which symptoms they can account for. The circadian rhythm theory of bipolar disorder posits that disturbances in sleep patterns can further increase the vulnerability to developing acute mood episodes in affected individuals (Nivoli et sl., 2011). Researchers refer to environmental factors that set our circadian clock as ‘zeitgebers’ (Miklowitz et al., 2000), or ‘time givers’. Examples of such zeitgebers include sun rise and sunset, but also more social factors, such as the timing of our meals, work and even TV programmes can have an important influence on our daily rhythm. Authors such as Ehlers et al. (1988) put forward the idea that such disruptions would

lead to affective disorders in vulnerable individuals. Again, this theory is a diathesis-stress model and a reminder of how the environment may be influencing the individual in terms of their behaviour and connected emotion. The role of cognition in is not clearly defined in this model (Simoneau et al., 1999) but is likely to determine how a given event is processed, i.e. how psychologically stressful it effectively is for each individual. It may be possible to extend the model with the concept of time perspective in that TP has shown to have an effect on cognitive variables that then lead to lifestyle choices that can affect social rhythm. For example, future TP has been linked to hours spent studying each week (Zimbardo & Body, 1999), which may be considered a zeitgeber. It is also linked to a preference for consistency (Zimbardo & Boyd, 1999), which is likely to be beneficial in maintaining a healthy routine for the individual. Time perspective could, in other words, measure the cognitive system which research has linked to behavioural outcomes common in bipolar disorder (Levy & Manove, 2012) – and potentially their emotional consequences. Time perspective theory would posit that the more extreme the TP bias, i.e. the higher a TP score is, the more maladaptive consequences it should have for the individual. It is therefore consistent with this thesis' hypotheses and previous research that higher TP scores would indicate higher levels of vulnerabilities (e.g. Boniwell, 2004). In this respect, time perspective may be a valuable addition to existing models such as the circadian rhythm theory as it underpins behavioural outcomes cognitively which may, in turn, be vulnerability factors for relapse in bipolar disorder. Thus, measuring TP could be used to monitor vulnerability to relapse; for example, by measuring intensity within the respective time perspectives, but also in terms of their balance. While circadian rhythm theory focuses on specific types of incidents that can disrupt routines specifically (Nivoli et al., 2011), time perspective is broader by measuring general response tendency on a cognitive level. However, because of this, it can capture what appears to underpin a variety of risk factors. For example, a low future TP is consistent with a low preference for consistency, and may thus be a risk factor for (hypo-)mania, but it is also reflecting hopelessness and should therefore be related to depression, as has been found in multiple pieces of research (see Zimbardo & Boyd, 1999). Indeed, high future TP is associated with having more structure in one's life (Zimbardo & Boyd, 1999).

A third dominant theoretical approach for understanding bipolar disorder will be discussed separately as it is the model this thesis will be based on. It has the advantage over the above models that it explicitly combines bio-psycho-social factors into one coherent model and is able to make predictions about what may lead to the development of both bipolar (hypo-) mania and depression. It is therefore scientifically particularly compelling. Time perspective

may also be most compatible with this approach and offers opportunity for time perspective to expand the model.

7.4. BIS/BAS Dysregulation Theory

Understanding bipolar disorder means integrating multiple strands of research on the psycho-social and biological contributors involved in the development and course of bipolar mood episodes (Levy & Manove, 2012). A comprehensive model would therefore encompass findings on factors such as life events, goal striving, cognitive style, decision-making and neurobiological abnormalities and their effect on bipolar mood symptom-development. The combination of both psycho-social factors and biological factors is important in developing a comprehensive picture of the disorder that can explain the development of mood episodes as well as the course of bipolar disorder (Levy & Manove, 2012). For example, genetic research has so far revealed who is more at risk of developing the condition (e.g. McGuffin et al., 2003) but psycho-social research has focused on exploring the course of bipolar disorder; for example, the timing and development of episodes.

One of the most popular models is especially scientifically compelling as it is combining psycho-social and biological aspects of bipolar disorder is that BAS Dysregulation Theory of bipolar disorder that has been proposed by Depue and colleagues (Depue, Krauss & Spoont, 1987; Depue & Iacono, 1989). According to this theory, individuals with bipolar disorder are hypersensitive to environmental cues related to reward and punishment (Depue & Iacono, 1989). Responding to the environmental cues, these individuals experience more extreme fluctuations in the activation and deactivation of their Behavioural Approach and Behavioural Inhibition (BIS/BAS)- system. The theory has its roots in reinforcement sensitivity theory (Gray, 1970; 1982; 1991) which proposed the existence of a neurological system regulating approach and avoidance behaviours that are closely linked to personality and psychopathology. More specifically, Gray outlined three systems that are based on neural pathways (Pickering & Gray, 1999). First, the behavioural approach system (BAS), initiates behaviours intended to approach reward or goals. When we spot cues in our environment that we perceive as a reward the BAS is activated and approach behaviour is initiated. Individuals' approach behaviours are believed to increase and when they are successful and the reward in question is attained, individuals feel elated and consequently become more sensitive to spotting stimuli likely leading to reward in their environment. To

accommodate more recent evidence, the BAS system was revised by Gray and Mc Naughon (2000). Instead of the BAS corresponding to rash impulsivity in the presence of reward, it is now recognised that impulsiveness does occur mainly when it is suitable for the pursuit of reward. Second, the fight-or-flight system motivates behaviours intended to escape punishment. Activation of this system often manifests itself in experienced fear (Gray & Mc Naughton, 2000). Third, the Behavioural Inhibition System (BIS) is activated when punishment-cues are detected in the environment. The BIS resolves conflicts between the competing systems. When activated, arousal rises, anxiety is experienced and risks are assessed and withdrawal behaviours are motivated (Gray & Mac Naughton, 2000). Given the negative emotion experienced when the BIS is activated, the individual may subsequently become particularly sensitive to punishment in an attempt to avoid further negative affect (Gray, 1991). The BIS was also revised to accommodate more recent evidence. In the revised version, the BIS still resolves conflict but also inhibits ongoing behaviour initiated by the BAS. Attention is then diverted towards the detected conflict (Gray & Mc Naughton, 2000).

Building on reinforcement sensitivity theory and the BIS/BAS system as a regulator of behaviour, Carver and White (1994) expanded the original model. They focused on the individual differences in the level of arousal within the system and the effect this has on subsequent behavioural regulation. They further linked the latter to affect. More specifically, they highlighted that the extent to which the BIS and BAS systems are activated as a baseline varies between individuals and is not only state-, but also trait-specific (Carver & White, 1994). In bipolar disorder, these individuals may experience chronic under-stimulation as a baseline (Depue & Iacono, 1989). These individuals may become particularly sensitive to the detection of reward- cues in the environment. Once activated, their BAS activation levels may also be particularly elevated a result, leading the individual to seek reward and stimulation excessively, as is he case in mania (Depue & Iacono, 1989). Individuals experiencing elevated levels of BIS activation, by contrast, are more inclined to avoid risk, distressing events or other punishment. This may be the result of chronic baseline over-arousal, Carver and White (1994) speculated, and could lead to depressive symptoms. In a further development of the reward sensitivity model, Carver and Scheier (1998) focused on the creation of affect that they hypothesized stems from the regulation of the BIS/BAS-system, and therefore from the regulation of goal and reward-pursuit. They suggested that affect is created via a feedback loop which tracks the rate of progress that is being made in relation to a goal. If we do not reach our target as fast or efficiently as we wish, negative affect can arise, and can motivate us to try harder (Carver & Scheier, 1998). In turn, if we

achieve our goal, this is likely to lead to positive affect. In other words, Carver and Scheier (1998), similarly to Gray and Mc Naughton (2000), appear to imply a cognitive appraisal process that tracks progress in relation to our goal and current situation. Affect is related to our cognitive evaluation of how well we are progressing towards the goal. Both the BIS and the BAS system can create different emotions based on this appraisal: The BAS may create joy and eagerness when we are doing well in our approach to reward, and frustration or anger when we are doing poorly. The BIS may create relief when we are successfully avoiding a threat, and anxiety and fear when we are failing to do so. Carver and Scheier's (1998) argument implies that goal regulation is related to affect regulation but also that the resulting experienced emotion leads to regulation of behaviour, e.g. by motivating us to try harder and trying harder may lead to a reduction of negative affect. Behaviour and affect are therefore always intertwined and in a most basic sense self-regulating. Psychopathology emerges when the self-regulation of the system is not functioning normally (Carver & Scheier, 1998); for example, depression or elation are only maintained when an individual fail to disengage with the goal or reward in question. Normal regulation would prompt disengagement with a goal when the pursuit of it has led to depression, fear or frustration (Johnson, 2005). Elation, on the other hand, should promote coasting over time which should slow progress and let elation fade. However, this regulation system is impaired in individuals with bipolar disorder. More extreme regulation of behaviour due to heightened sensitivity to reward and punishment may therefore lead to more extreme emotion (Gray & Mc Naughton, 2000). The manifestations of this can be symptoms of depression or mania at the most extreme ends of the mood spectrum. At the behavioural level, loco-motor initiation, incentive-motivation, positive affect, but also anger have been shown to be accompanying the activated BAS in experimental paradigms (Depue & Collins, 1999; Depue & Iacono, 1989; Fowles, 1987). An activated BAS can produce symptoms such as increased energy levels, decreased need for sleep, flight of ideas and increased involvement in goal-directed behaviour (Urosevic et al., 2008), thereby creating symptoms of mania. In the same vein, a deactivated BAS is believed to create symptoms of depression (Fowles, 1988; Depue et al., 1987). Although Depue believed that the BAS was more relevant to bipolar disorder, the BIS is equally connected to emotion: Withdrawal behaviour stirring us away from punishment may be expressed in relief or joy while unsuccessful withdrawal may provoke fear or sadness.

According to Dysregulation Theory, the BAS sensitivity to relevant environmental stimuli is a trait-like hypersensitivity. It constitutes a vulnerability that can manifest itself in various state-levels of BAS activation over time and situations (Depue & Iacano, 1989). This leads

to the question of when manic or depressive episodes develop. According to Depue et al (1987; 1989), the BAS responds to environmental stimuli which in turn exert great influence on the BAS that subsequently regulates our behaviour and with it, affect. A person's baseline BAS sensitivity and their appraisal of their current situation in relation to the reward may influence the timing of mood symptoms developing, as well as their magnitude. Earlier conceptions of the BAS Dysregulation model (Depue et al., 1987) highlighted that individuals with bipolar disorder may be genetically predisposed to mean trait levels of their BAS. The lower this mean is, the more likely it may be for them to develop depressive phases as opposed to manic states. This was a relatively crude measure for when mood symptoms develop. Later developments of the model (Depue & Collins, 1992) further stressed the importance of our interpretation of the environmental stimuli we encounter that may determine the magnitude of the activation of either the BIS or BAS. This point leads to the shortcomings of the model discussed in the next section.

7.4.1. Evaluation of the BAS Dysregulation Theory

Several variables that have independently been identified as predictors of bipolar mood episodes can be accommodated within the BAS Dysregulation model and provide empirical support for each aspect of the theory. A brief overview of the relevant literature will be discussed in the next paragraphs. However, there are also certain ambiguities in the BAS Dysregulation model of bipolar mood that will be addressed at the end of this section.
First, there are certain cognitive styles that appear to be distinctive in bipolar disorder which have a BAS-relevant element to them (Alloy et al., 2008). For example, the cognitive style of bipolar individuals appears to be marked by more autonomy than normal controls, as well as perfectionism and goal-striving (Alloy et al., 2008; Francis-Rainiere et al., 2006). It has been suggested that the interaction with such BAS-relevant cognitive styles and the occurrence of congruent negative events make the development of depressive symptoms more likely, or increase their intensity. The same cognitive styles and positive events together are by contrast believed to increase the chances or magnitude of manic symptoms (Francis-Rainiere et al., 2006). Second, there is evidence for the feedback loop that Depue and colleagues (1999) suggest is a vital part of affect regulation through the BIS/BAS system. The feedback loop is evaluating our progress towards a certain goal or reward in relation to our current situation. Whether our efforts are rewarded or not, as well as our baseline BIS/BAS sensitivity, influences subsequent sensitivity to reward and threat

(Urosevic et al., 2008). There is evidence to support high threat sensitivity associated with current major depressive disorder (Pinto-Meza et al, 2006). People with current depressive symptoms have greater decrements in performance after failing than normal controls (Elliott, Sahakian, McKay & Herrod, 1996, Holmes et al., 2009). This suggests elevated responsiveness to punishment. However, not supporting BAS Dysregulation theory in this aspect are the findings of a study that found no difference in behavioural choices after punishment in the form of loss of money (Henruqies & Davidson, 2000).

Third, life events have long been identified as environmental factors influencing the activation of the BIS/BAS system. Research within bipolar disorder on this issue has often focused primarily on negative life events and experienced stress (for a review, see Alloy et al., 2005). This broad category has been shown to trigger mood episodes in various studies (Elliott, 2003; Johnson et al., 2012; Swedsen & Merikangas, 2000), even where participants were on Lithium (Kulhara et al., 1999). By contrast, life events involving high goal-attainment have been linked to subsequent manic, but not depressive symptoms (Johnson et al 2000; Nusslock et al., 2007). Unlike these, general positive life events did not predict subsequent mania. The bulk of the available studies combine depressive and manic episodes in their analysis and thus no inferences are possible as to what specific mood is more likely after what life circumstances (e.g. Ellicott et al., 1996; Kulhara et al., 1999; Swendsen et al., 1995). Even more concerning is that a considerable number of studies found no difference in depressive or manic episodes triggered after particular types of negative life events (Reilly-Harrington et al., 1999).

In a further strand of research, prodromes as experienced by patients have been investigated. Overall, these seem to suggest that the most effective self-management strategies appear to be effortful BAS regulation by various means. For example, individuals with Bipolar I reported reduced sleep, and increased goal-directed activity as first signs of mania, and anhedonia was the most commonly reported prodrome of depression (Lam et al., 1997). Those patients with good coping strategies were more likely to decrease goal-directed activity by retraining themselves or taking extra time to rest to cope with mania. To cope with depression, they increased their goal-directed activity by keeping themselves occupied and by being more social (Lam et al., 1997). Over an 18-months period, those with more successful coping strategies were also less likely to relapse in a separate study by Lam and colleagues (2001).

In summary, the BAS Dysregulation model has been able to integrate a variety of research efforts on prodromes of bipolar mood episodes. There has been much support for the model from various studies on factors that may predict a particular mood episode. However, there is

some conflicting evidence around what factors are more or less likely to create abnormal mood and when. For example, 'life events' have not always been able to distinguish who is more likely to develop a depressive episode, as opposed to manic symptoms (Reilly-Harrington et al., 1999). This may be due to the number of confounding variables that may influence how a certain life event is processed by an individual. For example, it is possible that social support or personality factors such as resilience may buffer the effect of some events. In other words, our appraisal of the actual event is what may determine the activation of the BIS/BAS system. However, the process by which this may happen is not clearly outlined in the BAS Dysregulation model of bipolar disorder (Urosevic et al, 2008). This points to the general weaknesses of the theory, and opportunities for time perspective to add to the model.

Another implied appraisal process is that of the feedback loop, involved in assessing what in the environment is classed as a 'reward' or 'threat' by the individual. Urosevic and colleagues (2008) further added that the BAS Dysregulation model is also ambiguous about what constitutes an environmental trigger. They stress that there is currently no causal, clearly defined chain of events that leads to either a manic or depressive mood episode. Urosevic and colleagues, as well as Carver believe that "complex cognitions" are the "central components" (Urosevic et al., 2008, 13; Carver et al, 2010) in the process that regulates our affective response. However, little is known about the exact role and nature of the cognitions that may be involved. Fowles (1993) noted that BAS-relevant cognitions are often overlooked in research but potentially play a central role in bipolar disorder affect regulation. The process remains largely undefined (Urosevic et al., 2008) but would likely involve cognitive processes. Time perspective is a cognitive individual difference variable that may be able to add to the BAS Dysregulation theory as a way of measuring the cognitive component of the feedback loop- process that is involved in the appraisal of environmental stimuli and our progress towards rewards and goals. The next section describes how time perspective may add to the BAS Dysregulation theory and how both may enable the prediction of bipolar mood state prediction.

7.5. Time perspective within the BAS Dysregulation model of Bipolar Disorder

BAS Dysregulation theory of bipolar disorder has been criticised due to ambiguities within the chain of events that this model outlines in the development of a mood episode. More

specifically, it appears that some of the processes involved are implied but poorly specified (Urosevic et al., 2008).

The chain of events within affect regulation according to BAS Dysregulation theory at present is as follows: An individual monitors their environment and scans it for stimuli that may represent potential reward or punishment. Individuals with bipolar disorder may be particularly sensitive to spotting these stimuli (Depue et al., 1987). When a reward-cue is recognised, the BAS is activated and initiates approach behaviour. Progress towards to reward is then monitored and our appraisal of the rate of progress towards our goal gives rise to emotions, i.e. joy and elation when our approach behaviour is successful or frustration when it is not (Depue et al., 1987). Behaviours are adjusted accordingly. Failing to disengage with a goal that has been approached unsuccessfully may give rise to depression and frustration or anger (Johnson et al., 2003). Failure to disengage with a successfully approached goal may prevent the subsiding of positive affect and instead lead to elation typical for (hypo-) mania (Johnson et al., 2003). Urosevic and colleagues (2008) note that the aspects of this theoretical chain of events that lead to bipolar mood episodes which are implied but not clearly defined are the processes involved in:

a) *monitoring* the environment to identify reward and threat cues
b) *recognising* reward and threat cues
c) *appraising* reward and threat cues in terms of their significance to us
d) *appraising* one's current situation in relation to the goal/reward and one's progress in terms of reaching the goal

Diathesis-stress models such as the BAS Dysregulation theory of bipolar disorder focus on the dynamics between the individual and their environment. The link is crucial, yet often poorly defined, as is the case in the BIS/BAS model of affect regulation. Time perspective as a cognitive individual difference variable may provide one way of tapping into precisely this interaction between the individual and the external world and how it is processed, thereby relating to affect regulation. How this might work will be discussed below.

Time perspective is an individual difference variable that is believed to underpin "virtually all aspects of human experience" (Boniwell & Zimbardo, 2003, 129), including attitudes, values and behaviours. It guides current decision-making cognitively and consequently affects subsequent behaviour. This is done based on our personal preferences as part of our personality (Zimbardo & Boyd, 1999) as well as our current goals, e.g. immediate or delayed reward. In time-perspective terms, these goals are measured and understood as 'orientating behaviour towards the past, present or future'. If our goal is to attain long-term reward, a

future TP would accordingly guide our behaviour by orientating action towards the longer term goal. In practice, this might mean that decision-making will be in favour of staying home to work as opposed to going out (Zimbardo & Boyd, 1999). Instead of simply predicting action in line with goals, TP also predicts attitudes, values and habits. The same future-oriented individual may thus also be of the opinion that staying home is more beneficial than short-term reward, develop the habit of making to-do-lists and hold the value of advancing their career. Time perspective thus may predict various outcomes that are more likely based on an individual's dominant TP. This may be one advantage of TP as a predictor. Time perspective may be particularly well-suited to complement BAS Dysregulation theory for two reasons: First, time perspective is a way of measuring cognitive underpinnings of decision-making and the formation of attitudes. In our current thinking we are guided by our preference for the past, present or future as our reference point. Which time frame we rely on is determined by situational demands relative to our goals (Zimbardo & Boyd, 1999) and our habitual TP preferences. In other words, our preferred time perspectives are closely related to the situation we find ourselves in, as well as what type of goal we want to attain and when we want to achieve it, e.g. immediate pleasure versus bigger long-term rewards. If our goal is to maximize reward, it is for example more likely that we will orientate our actions towards the future. If our primary goal is immediate pleasure, it is likely reflected in a high present TP (Zimbardo, 2012). These features are linked to the missing parts of BAS Dysregulation theory of bipolar disorder (Depue et al., 1987) as outlined above and thus might provide a measure of capturing these poorly defined aspects within the model.

The BIS and BAS could potentially be understood as the neurological underpinnings of the cognitive processes that initiate or disrupt behaviour in the presence of punishment or non-reward cues (BIS). Another missing link in BAS Dysregulation theory is the process by which it is determined what is classed as 'rewarding' and how conflicts between rewards are handled within the BIS/BAS system (Urosevic et al., 2008). Time perspective may give an indication of this. For example, leisure time may be a reward for someone, yet it may depend on their personal preference and values how often they want to act on this reward as opposed to other rivalling rewards. Leisure time may, for instance, compete with an alternative reward, such as advancing their career, and can therefore it may not be possible to achieve both goals at the same time. In time perspective-terms, these goals can be understood as being underpinned by two different time perspectives (e.g. future TP for longer-term reward and present TP for short-term reward) and the dominance of each may change based on situational demands (Zimbardo & Boniwell, 2004).

A further point to illustrate why TP theory and BAS Dysregulation theory may be particularly well-suited to complement each other is that certain time perspectives share conceptual overlap with both the BIS and the BAS system and some of the behaviours associated with each system have been predicted by TP (see chapter IV for an overview). The latter is conceptually most related to present-hedonistic TP, while the BIS system is memory- based and may share overlap with the past TP (Depue et al., 1987; Carver & White, 1994). People that are past-oriented tend to be more cautious while present-hedonists are more impulsive (Zimbardo & Boyd, 1999). Future TP requires both, an inhibition of behaviour leading to immediate reward and activation in terms of behaviour that leads to long-term reward (Drake, et al. 2008).Time perspective has also predicted several BAS – relevant characteristics, such as working relentlessly (Samuels, 1997; Nowack et al., 2013), risk-taking, self-regulation (DeBilde, Vansteenkise& Lens, 2011) and self-control (Barber et al., 2009), impulsiveness (Baumann & Odum, 2012) and cautious behavioural style (Zimbardo & Boyd, 1999).

Depue et al. (1987) specified the characteristics of a poorly regulated BIS/BAS system in bipolar disorder. In particular, high arousal, high goal-directed activity, and high positive emotions are characteristic of high levels of BAS activity, and of hypomania. Low BAS levels, on the other hand, is associated with disengagement of rewarding activity and should lead to depression. Meyer, Beevers and Johnson (2004) found that hypomania was linked to an overly-optimistic future goal-orientated pattern; evidence that goal attainment and goal interruption are hyper-valenced in this disorder. Carver & White (1994) modulated Gray's ideas and designed the self-report measure that is used in this research, i.e. the BIS/BAS scales. In a study that used this measure, Myer, Johnson & Carver (1999) found that in students who are prone to mood disorders higher scores on the BAS Fun Seeking- subscale were obtained. This is conceptually related to the present-hedonistic TP. High BIS and low BAS- Reward Responsiveness were related to depression. In a longitudinal study with 59 bipolar disorder patients, Meyer, Johnson and Winter (2001) found that BAS Reward Responsiveness was predictive of increases in manic symptoms. Again based on conceptual overlap, it may be that the BAS system is related to present-hedonistic TP. In summary, TP could be capturing part of the cognitive underpinnings that help govern the neurological BIS/BAS system. It may provide a way of capturing those parts of the BAS Dysregulation model of affect regulation that are implied but still ambiguous (Urosevic et al., 2008).

The chain of events within time perspective-related cognitions may be as follows: Our personal preference for a certain TP is learned and shaped by many influences including culture, religion and social-economic status (Zimbardo & Boys, 1999). Temporal

preferences then guide current decision-making based on this personal preference. For example, a future-TP is understood to have various consequences in terms of what is important to the individual: they are more likely to place greater emphasis on bigger future reward, to work harder academically, to be more conscientious and to place greater emphasis on the consequences of their actions (Baumann & Odum, 2012; Boniwell & Zimbardo, 2004; Cretu, 2013; Drake et al., 2008; Daugherty & Brase, 2010; Laghi et al, 2009; Smith et al, 2012; Wittmann et al., 2014; Zahng & Howell, 2011, 2013). In other words, an individual's preferred time perspective determines what is more relevant to them or what they class as a 'rewards' or goals. In this manner, time perspective is a cognitive measure of what we perceive as rewarding and where we place our goals, in the present, past, or future. What we decide our goal is then influences our current decision-making and attitudes (Zimbardo & Boyd, 1999). The BIS/BAS system may then initiate the action and the cognitive feedback loop provides feedback based on the goal selected relative to our current situation and progress. Our actions may then manipulate our environment further shaping the course of the disorder.

Time perspective may thus have the following roles within the BAS Dysregulation model of bipolar disorder: First, time perspective identifies a personal preference for locating goals and reward in either the future (long-term maximum pay-off) or present (sensation and immediate pleasure or pay off) and for how much their past experience guides them (Zimbardo & Boyd, 1999). With these preferences in mind, the environment may then continuously be monitored for reward-cues. With time perspective as an addition to the BAS Dysregulation model, it is now possible to make predictions regarding what environmental cues may be more or less likely to be relevant to the individuals based on their perception of what is classed as a reward (compare Zimbardo & Boyd, 1999). Once a reward-cue has been identified as significant and in line with the individual's goals and values, the BAS and the selected goal may be approached. Time perspective guides subsequent decision-making and behaviours.

In summary, this section has discussed how time perspective may function within the BAS Dysregulation model of affect regulation in bipolar disorder (Depue et al., 1987). The next section will discuss potential practical implications of such a combined model for applied psychology. More specifically, it will discuss current psychological treatment options for bipolar disorder and how the concept of time perspective may add to these.

7.6. Current Psychological Treatment Options for Bipolar Disorder and Time Perspective

Current psychological treatment options for bipolar disorder aim to reduce the frequency and impact bipolar acute mood episodes can have on a client's daily lives (Ball et al., 2003). Long term prevention of relapse is an important aim (Nivoli et al, 2011). Such approaches can be multi-faceted, targeting biochemistry, lifestyle choices and psychological and physiological health. This section discusses how time perspective may offer a valuable contribution to some of the interventions available.

First-line treatment for bipolar disorder patients is usually pharmacological to stabilize the individual's mood symptoms. However, the goal of finding mood stabilizers has not yet been realised and relapse can occur frequently (APA, 2012; Bauer & Mitchner, 2004).

Alongside pharmacological intervention, psychosocial treatment may additionally be pursued as maintenance and prevention treatment. This may include various options ranging from befriending, dialectical behavioural therapy, family therapy, interpersonal therapy, psychoanalytical psychotherapy, self-help groups, to self-management, guided self-help and support networks for the milder end of the spectrum (Bowden, 2005). The next paragraphs will focus on introducing psychological interventions for bipolar disorder and how time perspective may add to them.

Interpersonal and Social Rhythm Therapy (IPSRT) is a treatment option for bipolar disorder that focuses on the impact disrupted social rhythms can have on patients with the condition, in terms of what they do to regulate their circadian rhythm, but also in terms of work, exercise, meal times and other activities (Frank et al., 1997; Frank et al., 1999). It assumes that such rhythms are strongly influenced and stabilised by 'zeitgebers' that can be specific significant people in the patients' lives or regular occurrences and routines. It focuses on fostering an awareness of the impact disrupted social relationships can have, as well as on how to manage stressful life events successfully in order to prevent future episodes.

Behavioural Family Therapy (BFT) is a further treatment option for bipolar disorder patients, often used where psychosis is present (Simoneau et al., 1999). This type of family therapy involves three main components: Psycho-education, communication enhancement and problem-solving skills training. The therapist and patient work together to come up with a 'relapse drill', i.e. an action plan that comes into effect when there is a relapse. The intervention on the whole is designed to improve family functioning, mood and risk of relapse. An adaptation of BFT, family focused therapy (FFT), has been shown to be particularly beneficial in bipolar disorder (Simoneau et al., 1999; Miklowitz et al., 2000) and in particular for

improved family functioning (Simoneau et al., 1999). A two-year follow-up demonstrated that the effects for the patient were lasting, i.e. fewer relapses and longer remission phases were reported, compared to those who received crisis management intervention (Miklowitz et al., 2003). FFT also had a significant benefit compared to individual intervention in terms of reducing hospitalisations (55% compared to 88%).

A further widely used psychological intervention used in bipolar disorder is Cognitive-Behavioural Therapy (CBT) which is arguably the model that is most compatible with time perspective. The Matrix (2011) recommends CBT for relapse prevention in stable individuals with bipolar disorder, as well as group psycho-education for patients in the remission-phases. In acute phases, the Matrix also recommends CBT for those patients with less than 12 episodes. This evidence is graded A, i.e. the highest available recommendation. The Scottish Intercollegiate Guidelines Network (SIGN, 2011) also recommends CBT as the standard psychological intervention for bipolar disorder in up to 16 sessions over 6-9 months (SIGN, 2011). Given its current central role in treating bipolar disorder, and based on theoretical overlap with this cognitive-behavioural model, it will now be discussed how time perspective may add to currently used CBT interventions.

CBT is based on the assumption that cognitions are linked to mood and behaviours (Lam et al., 2003). The link between those three systems are learned and may become reinforced the more often the same pattern is used. CBT therapy combines behavioural techniques and cognitive The therapist aims to teach the patient how the systems are connected, as well as how to monitor, examine and change dysfunctional thinking and behaviour associated with undesirable mood states. There are three theoretically sound studies that show a benefit of 7-25 sessions of CBT for relapse prevention and improved social functioning over 18 months in bipolar patients (Lam et al., 2003; Schalet et al., 2011; Perry et al., 2013.

The CBT interventions that were used in these studies were compared to waiting list and treatment as usual controls. Patients were taught to monitor early warning signs of acute mood symptoms. They were taught to identify manic or depressive episode prodromes and were assisted to develop a list of risk-situations and were assisted in developing an action plan to use when they would recognize these prodromes themselves. The specific actions to take and the spotting of potential prodromes were then rehearsed in the course of therapy. Teaching cognitive-behavioural techniques for relapse-prevention this was was effective in affect regulation long-term (18 months; Lam et a., 2003). Time perspective is a cognitive individual difference variable underpinning decision-making and may thus be accommodated within the CBT model. Should time perspective underpin bipolar mood states, it may be a valuable addition to this type of intervention as it is easy to monitor via self-report using the ZTPI

(1999). Additionally, temporal theory outlines what constitutes a healthy TP profile, i.e. a balanced TP, and what is unhealthy (a TP bias). Both can be measured. Where biases occur, these may be altered once brought to conscious attention. Mann, Kato, Figdor & Zimbardo (1999; in Zimbardo & Boyd, 1999) report a study with 40 cancer survivors that they randomly assigned to write about the past, present or future for two weeks. Those who wrote about the future reported significantly increased optimism ($M=10.6\%$, $z=2.08$, $p<.05$). Writing about the present had no effect and writing about the past decreased optimism, but not significantly so. However, the results were not followed up after the end of the study and thus it is unclear whether or not the effect was lasting. Given that the participants were only monitored for two weeks, it is additionally possible that the measured effects were due to natural fluctuations, as opposed to being due to the time perspective intervention. Yet, if there was a true effect monitoring time perspective biases would be cost-effective as it may be done via self-reporting. Furthermore, it may be argued that 'traditional' CBT techniques may be used to balance TP biases in a more targeted fashion. For example, a future TP may be fostered by behavioural activation by focusing the patient on future rewarding and meaningful activity. Present TP may be fostered by techniques such as mindfulness, breathing techniques, relaxation and engaging in enjoyable activity. Finally, there is less of a focus on the past in CBT and therefore there are arguably less standard CBT techniques available. However, it is known that nostalgia, which arguably shares overlap with the past-positive TP, buffers depression. It may be encouraged by techniques such as imagery re-scripting which may be used in clinical intervention that aims to update unpleasant or traumatic memories, often used in treating PTSD (Angst, 2013). Which of these techniques should be more or less emphasized in the treatment of bipolar disorder may depend on the client's goal. However, temporal theory may be helpful in guiding which strategies to focused on.

SIGN also makes the case for group-psycho-education for patients affected by bipolar disorder. Over 21 sessions, group work on relapse prevention through education had greater success in terms of relapse prevention than unstructured group meetings (Colom et al., 2004). The main issues covered in the relevant successful group included four main topics: illness awareness, treatment compliance, early detection of prodromal symptoms and lifestyle choices. Time perspective may add to CBT group therapy in much the same way as described above. Monitoring one's TP may increase patients' understanding of their illness and may help them detect early warning signs, potentially in part reflected in time perspective biases.

7.7. Chapter III summary

Chapter III aimed to combine time perspective theory with the dominant models within the field of bipolar disorder. This chapter began by discussing general approaches to bipolar disorder, i.e. dimensional versus categorical approaches as well as the diathesis-stress model. A general model combining bio-psycho-social research evidence was then presented (Levy & Manove, 2012), after which concrete psychological models were discussed that aim to understand the development of bipolar mood episodes; the subject of this PhD. A focus was placed on reward sensitivity and the BAS Dysregulation model of bipolar disorder (Depue et al., 1987) and how time perspective may function within this theory. The resulting hybrid model is the theoretical foundation for this thesis. The next chapter will investigate time perspective evidence and how it may relate to bipolar disorder symptoms.

8. Chapter IV:
Review of available convergent evidence of Time Perspective in Bipolar Disorder

The previous chapters have introduced temporal theory and bipolar disorder. The case for applying TP to this condition specifically was made and a theoretical model of how TP may function in bipolar disorder was subsequently made. This hybrid model was based on BAS-Dysregulation theory of bipolar disorder and temporal theory. Given that TP has never been applied to BD before, chapter IV will now review convergent evidence in order to investigate whether or not the available evidence on bipolar disorder and time perspective indeed suggests that time perspective could function within bipolar disorder in the way the hybrid model suggests in chapter III. This chapter will therefore form a central part of the thesis argument and will argue that time perspective is:

- likely to underpin affect regulation in bipolar disorder and that
- specific time perspectives are likely to predict mania, depression, mixed mood states and euthymia differentially.

Given the fact that there is no direct evidence linking TP to bipolar disorder that this thesis could expand on, the thesis argument is based on various sources of convergent evidence. An overview of the available evidence on time perspective will be given first. The findings will then be considered in terms of how they may overlap with bipolar disorder presentations. While there is no direct evidence linking the two concepts, part of the rationale for testing if time perspective can predict bipolar mood states is that it has previously shown to underpin a vast array of diverse variables that are, to a large extent, relevant to bipolar mood symptoms as will be demonstrated below.

8.1. Time perspective evidence and Bipolar Disorder symptoms: Evidence overview

Time perspective is believed to underpin virtually all aspects of human behaviour (Boniwell & Zimbardo, 2004) since it has been shown to be associated with various domains of functioning in previous research. The evidence base is diverse, including behaviours, attitudes, values, personality traits, cognitive ability, identity status, suicidal ideation and many other diverse variables associated with time perspective (Drake et al., 2008; Fieulaine & Matrinez,

2010). An overview will be presented in the following paragraphs. Part of the rationale behind testing whether or not time perspective could be useful as a predictor in clinical psychology is based on the fact that this cognitive variable has proven to be an effective predictor in nearly all other aspects of our human experience. Some of these variables are likely to be indirectly related bipolar disorders in that they are part of a vulnerability profile for individuals with genetic predispositions to the illness. Among the behaviours are risky behaviours (Zimbardo, Keough & Boyd, 1997) such as driving under the influence of alcohol, not wearing a helmet and other risky driving manoeuvres. Present-hedonistic time perspective appeared to play an important role in this as it was highly and positively correlated with such behaviours. Men interestingly reported to be more present-oriented than women. Substance misuse has also repeatedly been linked to present time perspective (Fieulaine & Martinez, 2010; Wills, Sandy & Yaeger, 2001) as have other maladaptive behaviour involving poor impulse control or addiction (Laghi et al., 2012).

In contrast, behaviours that require self-control and motivation, i.e. either adhering to medication routines or stopping addictive behaviours were related to future time perspective, which is concerned with the ability to control impulses and urges (Hall, Fong & Meng, 2014; Sansbury et al., 2014). Future time perspective also predicts health behaviours positively (Daugherty & Brase, 2010), habits, organized living (Zimbardo & Boyd, 1999), taking care of obligations earlier than controls (Harber & Zimbardo, Boyd, 2003), attending regular health check-ups (Guarino et al., 1999, in Zimbardo et al., 1999). Practicing safe sex (Rothspan & Read, 1996; Hutton et al., in Zimbardo & Boyd, 1999) also is contributed to this time perspective. In summary, these results provide support for the conceptualization of future time perspective in that FTP is designed to capture an orientation towards future goals, which includes the ability to exercise self-restrain and resisting temptation and urges.

Besides behaviours, future TP also predicts cognitive variables reflecting such abilities (Zacher, 2014), motivation (De Bilde, Vannsteenkiste & Lens, 2011), mindfulness (Wittmann et al., 2014), self-regulation (Barber et al., 2009; Zebardast et al., 2011; Haghighatgoo, Besharat & Zebardast, 2011), Identity status (Laghi et al., 2013), relationships (Cretu, 2013), values (Milfont & Gouveia, 2006), cognitive ability (Nowack et al, 2013) and autonoetic experience (Arnold, McDermott & Szpunar, 2011).

The present TP is believed to be the opposite in that it is concerned with enjoying the present situation with little concern for outcomes. In line with this definition, it is linked to impulsiveness (Baumnann & Odum, 2012). A variety of negative personality traits, such as aggression, depression. However, present-hedonistic individuals also report to be more open

and friendly (in Zimbardo & Boyd, 1999) and it is also linked to spirituality (Cretu, 2013) and higher life satisfaction (Zhang et al., 2011).

The past-positive time perspective also predicted religiosity (Zimbardo & Boyd, 1999) and cautious more behaviour, as well as positive coping skills (Holman & Zimbardo, 1999). These individuals are more likely to be introverted (Zimbardo & Boyd, 1999)

The past negative TP negatively predicts good communication about stressful life events (Holman & Zimbardo, 1999). Students with this TP bias also reported to have fewer friends and less romantic contacts than future oriented peers. The same students were also more likely to be depressed and less likely to be conscientious and open than their peers (Zimbardo & Boyd, 1999). They are also more likely to engage in problematic internet use, i.e. considering the internet an 'escape' from reality (Chittaro & Vianello, 2013). A focus on trauma and bad memories also not surprisingly negatively predicts life satisfaction (Zhang & Howell, 2011), self-efficacy, self-regulation (Zebardast et al., 2011) and mindfulness (Wittmann et al., 2014).

In summary, the past-negative TP appears to be associated with plenty of negative outcomes and is rarely linked to an outcome beneficial to healthy functioning. The past-positive TP, however, is much more positive, reflecting a warm and nostalgic attitude that is believed to be positive in times of high stress (Juhl et al., 2010). Time perspective theory also assumes that past-orientation leads to a more cautious, introverted approach to life, though it is also connected to traditions and a sense of safety sourced from this (Zimbardo & Boyd, 1999).

The future time perspective appears to lead to a number of positive outcomes. However, it has to be noted that it does not predict well-being (Drake et al., 2008). As the literature suggests, this is possibly due to a focus on future goals that is too strict and allows less time for leisure activities and maintaining healthy relationship to significant others (i.e. Boniwell & Zimbardo, 2004).

While a future TP appears to be considered beneficial long-term and thus is considered to be necessary for overall well-being by some authors (Kahana & Kahana, 1983; Wills, Sandy, Yaeger, 2001), a present-orientation is the opposite: Beneficial short-term, predicting higher openness, friendliness, and interpersonal connections (Zimbardo & Boyd, 1999). However, this TP is dangerous long-term, especially a present-fatalistic outlook on life, but also the fun-seeking present-hedonistic perspective which reflects a concern for long-term goals. It may be argued that an ability to focus on the present moment is also needed for well-being and health, though this is most likely to only be effective when it is met by a roughly equal future TP.

The quality of evidence is generally good in terms of the vast majority of TP research using standardized measures such as the ZTPI (1999) that have repeatedly achieved high levels of internal reliability and validity. However, almost all of the studies are cross-sectional in nature

and are based on self-report, limiting the quality of the existing evidence base on TP considerably.

The diversity of evidence is summed up in table 4 (see below). As can be seen from this summary, time perspective has shown to underpin a large amount of diverse aspects of functioning, most of it relevant to clinical psychology and also to bipolar disorder (i.e. risky behaviour, substance use, impulsiveness). These pieces of evidence are discussed in the next paragraph. This summary aimed to demonstrate the diversity in concepts time perspective underpins on a cognitive level, encouraging an investigation into a potential link to mood as another potential area of human experience TP may help regulate.

Table 4: Overview of variables predicted by TP in previous research

Variable predicted by TP	Authors	Methodology	Sample Size	Results
Behaviours				
Smoking cessation	Hall, Fong & Meng (2014)	8-year longitudinal cohort study. Computer assisted telephone Interview (CATI)	9772 adults in 4 countries: Australia, USA, Canada &UK	Future -TP predicts smoking cessation across all four countries.
Medication Adherence in Diabetes	Sansbury, DasGupta, Guthrie & Ward (2014)	Community-based survey. Path analysis	178 U.S. Adults	Future TP positively predicts medication adherence in diabetes. Authors conclude TP plays an under-recognized role as a psychological motivator
Risky driving	Zimbardo, Keough & Boyd (1997)	Self-report across 3 replications	2863 U.S. Adults in total	Present TP is highly correlated with reported risky-driving. Negative correlation between future TP and risky driving. Males were more present-oriented, females more future-oriented
Substance use	A) Fieulaine & Martinez (2010) B) Wills, Sandy &	Self-report, cross-sectional	A) 240 French individuals aged 15 and above	A) Present-Hedonistic TP positively predicts substance use. Future TP negatively predicts substance use, both mediated by desire for control.

	Yaeger (2001) C) Apostolidis et al. (2006)		B) U.S. school students C) U.S. adults	B) & C) Cannabis use predicted inversely by future TP.
Binge drinking/ Binge eating	Laghi, Liga, Baumgartner & Baiocco (2012)	Cross-sectional survey	1350 17-19-year-olds	Future TP predicted binge drinking and binge eating negatively; present-fatalistic TP and past-negative TP predicted these behaviours positively.
Health Behaviours	Daugherty & Brase (2010)	Survey	467 psychology undergraduates in the U.S.	*Future TP predicted: exercise, wearing a helmet, having regular health check-ups, wearing sunscreen positively and tobacco use, alcohol use and drugs negatively. *Present-Hedonistic TP: tobacco, alcohol, drugs, exercise was predicted positively; having breakfast, and wearing a safety belt were negatively predicted *Present-fatalistic TP: Predicted tobacco, alcohol and drug use positively and having breakfast and wearing a safety belt negatively
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Wearing wrist watches	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Students with present-hedonistic bias were less likely to wear a watch than their peers
Making to-do lists/organized living	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Students with a bias in future TP made to-do-lists more often than peers & used day planers and balanced their chequebooks. They also reported to have more structure in their lives
Research participation behaviour	Harber, Zimbardo & Boyd (1999)	Quantitative	167 students in the pilot and 287 in	Future-oriented students began participating in research earlier in the semester as part of their requirements. Present-

			replication, U.S.	oriented students were three times more likely to not appear for the research after signing up
Exercise	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Students with Past-negative bias exercised less than peers with different TP biases
Nutrition/Food choice	Zimbardo & Boyd (1999)	Interview study	31 Stanford University Students	Future-TP bias predicted selecting food choices based on nutrition over choice
Attending regular health check-ups	Guarino, De Pascalis & DiChiacchio, 1999, in Zimbardo et al., 1999		150 Italian women in public hospital	Future-oriented women attended breast cancer screenings more regularly than controls. Those women high in present-hedonistic TP attended those check-ups less regularly.
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
HIV risk behaviour	A) Rothspan & Read (1996) B) Hutton et al. (1999), in Zimbardo and Boyd, 1999	Survey	A)188 heterosexual college students B) 978 incarcerated women in the U.S.	A) Participants high in both present TP's were more sexually active and had more sexual partners than future-oriented students but the latter were more likely to alternate methods of reducing HIV exposure. B) Future-TP scores predicted being less likely to have had sex partners who used intravenous drugs & having had less sexual partners. Present-Fatalistic TP predicted increased likelihood in engaging in these risk behaviours. Authors conclude future TP may reduce the likelihood of practicing HIV risk behaviour (p.14).
Problematic Internet Use	Chittaro & Vianello (2013)	Survey	Italian adults sample	Past-negative and present-fatalistic scores predicted problematic internet use which involves a compulsive preoccupation to use the

				internet, subjective feelings of inability to limit internet use and using the internet to escape or alter moods
Cognitive Factors				
Career Adaptability	Zacher (2014)	6 months-follow-up survey	659 Australian adults	Future TP predicted change in career adaptability (=Cognitive variable combining attitudes, competencies and behaviours we use to fit ourselves to one career)
Self-regulated learning	De Bilde, Vansteenkiste & Lens (2011)	Cross-sectional, survey	275 Belgian high school and university students	High future TP scores predicted regulation of study behaviour on the basis of internal motives (e.g. shame/guilt). Present-hedonistic TP negatively predicted such regulation
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Mindfulness	Wittmann, Peter, Gutina, Otten, Kohls & Meissner (2014)	Cross-sectional self-report survey	63 German students	Past-negative TP inversely predicts mindfulness level. Past-positive and future TP predicts mindfulness positively
Suicidal Ideation	Laghi, Baiocco, D'Alessio, & Gurrieri (2009)	Survey	3700 Italian Adolescents	Past-negative and Present-fatalistic TP explained suicidal ideation best, both positively predicted it
Self-regulation	Zebardast, Besharat, & Hghighatgoo (2011)	Survey	383 students in Iran	Past-negative, present-hedonistic and present-fatalistic TP predicted controllability negatively. Well-being -seeking and controllability was positively related to future TP
Self-control as a moderator between TP and academic achievement	Barber, Munz, Bagsby & Grawitch (2009)	Survey	255 college students	Future TP predicted higher GPA scores, but only in low self-control students.

Self-efficacy	Zebardast, Besharat, & Hghighatgoo (2011)	Survey	391 students in Iran	Positive correlations between self-efficacy and future TP. Negative correlation between self-efficacy with present-fatalistic TP and past-negative TP
Autonoetic experience (Ability to mentally time travel)	Arnold, McDermott & Szpunar (2011)	Survey	133 undergraduate students, U.S.	Future and Present-hedonistic TP predicted the degree to which people reported feelings of mentally traveling in time and the degree to which they reported pre- or re-experiencing the event
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Controlling-styles	Haghighatgo, Besharat & Zebardast (2011)	Survey	266 Iranian students	Positive correlation between present-hedonistic TP and inner direction controlling style and lack of constraints on behaviour. Inner-direction was also positively related to FTP and PPTP
Identity formation				
Identity status	Laghi, Baiocco, Liga, Guarino & Baumgartner (2013)	Cross-sectional, self-report	1300 Italian adolescents	Future TP and past-positive TP predict and integrated identity achievement. Diffused identity is predicted by past-negative TP and inversely by FTP
Values				
Values	Cretu (2013)	Survey	1260 Romanian adults	*Spirituality: Predicted by present-fatalism and past-positive TP. *Family and Intimate relationships emphasis was predicted weakly by Future TP *Status and Wealth emphasis was not predicted by TP
Environmental attitudes/ values	Milfont, & Gouveia (2006)	Survey	247 undergraduate students in Brazil	Future TP was positively correlated with environmental preservation and altruism. Environmental utilization was negatively

				correlated with present-hedonistic TP.
Status				
Socio-economic status and health	Guthrie, Butler, & Ward (2009)	Survey	525 adults, U.S.	Future time perspectives were higher in adults with higher education status and those with current professional occupation status. Present-fatalistic scores were lower in these groups than in adults with less education/no professional occupation. TP did not predict obesity, smoking, or exercise
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Roles and status	Samuels (1997)	Survey	4 years-follow-up, 136 cadets at U.S. Air force vs officers	Officers were lower on present-fatalistic, past-negative and present-hedonistic TP than cadets. On future TP, officers were highest, seniors lower and freshmen the lowest. Past – positive scores showed systematic increase over each of the 4 years military training
Cognitive Resources				
Reaction times, error rates and cognitive resources	Nowack, Milfont & van der Meer (2013)	Experiment + survey	52 German adults	Future time perspective predicted lower error rate in a relatedness judgment task. Future-oriented participants invested more cognitive resources in the task and out-performed present-oriented participants in reaction times
Individual Differences				
Impulsivity	Baumann & Odum (2012)	Survey	143 college students	Motor-impulsiveness was positively correlated with present-hedonistic TP and negatively with future TP/ Non-planning impulsiveness was positively correlated with fatalism

GPA scores	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University Students	Present-fatalistic biases predicted lower GPA scores
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Coping with Homelessness	Epel, Bandura & Zimbardo (1999)	Field study: Longitudinal, 2 questionnaires 3 months apart	82 homeless adults in shelters, U.S.	Future-oriented participants had shorter times of being homeless, were more likely to enrol in school, and were more likely to report learning from their predicament. Those higher in present TP's reported more avoidant coping strategies, spending more time watching TV and eating, working less and not saving money.
Well-being/Happiness				
Life satisfaction	Zhang & Howell (2011)	Survey	754 undergraduates, U.S.	Past-positive and present-hedonistic TP predicted higher life satisfaction; past-negative TP inversely predicted life satisfaction. TP predicted an additional 13.7% of the variance in life satisfaction beyond personality traits that were also measured as predictors.
Well-being	Drake, Duncan, Sutherland, Abernethy & Henry (2008)	Survey	260 Scottish adults	Balanced TP participants were significantly happier and more mindful. Future TP did not correlate with well-being
Personality				
Hardiness (personality)	Haghighatgo, Besharat & Zebardast (2011)	Survey	372 Iranian students	Control negatively related to past-negative TP and future TP. It also related positively to past-negative TP and present fatalistic TP
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Personality	Unclear authors ("independent	Survey	unclear	Correlations: *Past-negative TP: positive relationship to aggression, depression. Negative relationships to:

	investigators", p. 1279 in Zimbardo & Boyd, 1999)			friendliness, conscientiousness, openness, impulse control. *Present-Hedonistic: Positive correlation to aggression, depression, friendliness, openness. Negative relationships to conscientiousness, impulse control. *Future: Positively related to conscientiousness, self-esteem. Negatively to aggression, depression And further correlations
Stress	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University Students	Students with future TP bias reported more stress than peers and pressure to use their time wisely. They reported to have less time
Shyness	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University Students	Past-positive biases predict introversion (though these students do get involved with friends and family) and acting in a 'better safe than sorry'-manner
Cautious behavioural style	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University Students	Past-positive TP bias predicted a cautious behavioural style and they took less risks than peers
Attitudes				
Wanting to live longer	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Present-fatalistic TP bias predicts wanting to live less long; future-TP bias predicts wanting to live longer
Variable predicted by TP	**Authors**	**Methodology**	**Sample Size**	**Results**
Number of children student want	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Future TP bias predicted wanting less children than student with other TP biases
Attitudes to gambling	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Students with past-negative bias had more positive attitudes to gambling/gambled more than their peers with different TP's

Social factors				
Number of friends and romantic contacts	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University students	Students with a Past-negative bias report to have fewer friends and romantic contacts
Coping with trauma, social support	Holman & Zimbardo (1999)	Survey	Several college samples, U.S.	Negative association between past-negative TP and communication with family members about stressful experiences. Present-hedonism was a positive predictor of how much students discussed their stress with friends. However, PHTP was also positively related to avoidance coping. Present-fatalistic TP was associated negatively with active problem-solving. Past-positive TP is associated with positive coping.
Spirituality				
Religiosity	Zimbardo & Boyd (1999)	Interview Study	31 Stanford University Students	Present hedonistic biases students were less likely to be religious than peers. Past-positive biases predicted spirituality.

The section above gives an overview of the variables that time perspective has predicted in past research in order to demonstrate the breadth of variables it appears to underpin. The next sections will look into whether or not this evidence may be applicable to core features of bipolar disorder in general, and then to specific mood symptoms of mania and depression.

8.2. Time perspective evidence and central features of Bipolar Disorder

The following sections will discuss how time perspective may be underpinning central features of affect regulation in bipolar disorder. These will be discussed separately.

8.2.1. Cognitive impairment and Time Perspective

Cognitive impairment is a functional outcome, as well as a strong predictor of psychosocial disability in bipolar disorder. Several cross-sectional studies summarised in reviews indicate that cognitive deficits in bipolar disorder include executive dysfunction (i.e. managing several projects at the same time, initiating projects, and organizing complex tasks (Deckersbach, Armistead & Otto, 2007; Deckersbach et al., 2008), attention and memory (Goldstein, 2012). These difficulties often still exist in euthymia (for a review: Arts et al., 2008). The fact that both cognitive and psychosocial impairments co-exit even outside of acute mood episodes led to hypotheses about the adverse effects of cognitive dysfunction on social life. This line of work gained considerable support from longitudinal studies which used cognitive measures to predict long-term outcomes in bipolar disorder (Burdick, Goldberg & Harrow, 2010; Dickerson et al., 2010; Martino et al., 2009). The evidence overall suggests that cognitive impairment diminishes psychosocial functioning including occupational functioning and higher rates of disability (Atre-Vaidya, 1998). It also appears as though the cognitive impairment in the disorder is progressive over the course of the illness (Elshahawi et al., 2010) and correlated with psycho-social decline. The core cognitive dysfunction in bipolar disorder is cantered on the central executive system (Mur et al., 2007). Research suggests that the deficits in learning and memory are probably secondary to executive impairment (Thompson et al., 2009). These impairments have been tied to difficulties in accomplishing everyday life tasks, including poorer academic performance (Biederman et al., 2010), worse vocational outcomes including unemployment (Johnson et al., 2008; 25,51), reduced social adjustment (Yen et al., 2009) and diminished quality of life (Brissos et al., 2008).

There is no direct evidence in terms of time perspective and executive functioning. However, it is known that mind-set switching exhausts executive resources (Hamilton et al., 2011). Mind-sets are by definition very similar to time perspective: Both are mental states that produce a disposition or readiness to respond in a certain manner (Hamilton et al., 2011, 1) and influence decision-making. If time perspective underpins mood states in bipolar disorder, we should see more extreme and/or frequent mindset-switching, which should exhaust executive functioning in bipolar disorder and result in deficits, perhaps especially for those individuals that have suffered from the illness for the longest. This is indeed supported by a large body of research, showing that executive dysfunction is most extensive in later stages of bipolar disorder (Elshahawi et al., 2010).

8.2.2. Mindset-switching and Bipolar Disorder

The concept of mindset-switching may be closely related to the observed cognitive impairments in bipolar disorder that were discussed in the section above; especially if time perspective did underpin bipolar mood states.

The notion of mindsets dates back to the beginnings of experimental psychology (e.g. Ach, 1905). To qualify as a 'mindset', the underlying cognitive procedures must fulfil two criteria: First, they must be more general than those needed strictly for the completion of a task. Mindsets hence promote orientations that are not specific to the task at hand (Hamilton et al., 2011). They represent a global 'readiness' to respond in a particular way (Freitas, Gollwitzer & Trope, 2004). Second, mindsets are not limited to the task at hand and remain activated after it is completed, thereby influencing other subsequent and unrelated tasks. Mindsets differ from goals in that they lack the motivational component and do not include a movement towards an end-state. Mindsets also differ from schemas in that the latter are based on memories and mindsets are not specific to the past only (Hamilton et al., 2011).

When solving any given problem, we have the remarkable ability to view the issue or task at hand with varying qualitatively different methods, or 'mental states'. Hamilton et al. (2011) describe these mental states as 'mindsets', or a "[…] set of mental processes that produce a disposition or readiness to respond in a particular manner" (p.13. Hamilton et al, (2011) further describe them as 'important for human judgment and decision making' and some mindsets can '*magnify biased responding'*. Previous research suggests, they add, that optimal decision-making requires the use of more than one mindset because two mindsets may both have benefits and risks so that there is often a trade-off between two. Depending on situational demands and our motives at any given time, we are able to switch between them. The exact same definition could be used for time perspective, which does not automatically make the two concepts equal but gives rise to the possibility of considerable overlap. The five time perspectives could easily be described as such mindsets; the difference is, however, that time perspective is more specifically defined as being temporal in nature. The advantage TP adds to mere 'mindsets' is that it is operationalized and may thus be measured and linked to other psychological functions more easily than the vague notion of
mindsets.

What makes mindset-switching particularly interesting is the consequences it has on central executive functioning, which is understood to be impaired in bipolar disorder (e.g. Frangou et al., 2005). Temporal theory does not address how or when people switch time-perspectives at

all. This is one of the clear drawbacks of time perspective theory: It is very non-specific and unclear in various aspects, such as what makes us switch from one TP to the next, or whether it is possible to hold two or three at the same time and how much each of them would guide out behaviour and decisions. Hamilton et al (2011) propose that the process of switching is not automatic but requires considerable executive resources, leaving less regulatory power for other activities also governed by executive functioning. It is already known that performing one activity that requires executive resources will drain resources of the system and will leave less resources for other executive functions (i.e. Baumeister, Vohs & Tice, 2007) such as self-regulation (Baumeister, 1998) and decision- making (Vohs et al., 2008). If executive resources have been sufficiently taxed, people are vulnerable to failures of self-control, such as emotional outbursts (e.g. Baumeister & Bratslavsky, Muraven & Tice, 1998; Vohs & Heatherton, 2000). If mindset-switching was also controlled by executive function, it would drain resources and make acts such as self-regulation more difficult, leading to more emotion-regulation problems. Hamilton et al. (2011) provide experimental evidence to show that this is actually the case. Across five experiments with a healthy adult population, they found support for their hypothesis that switching mindsets is indeed an executive function and consumes self-regulatory resources. Switching mindsets more often led to problems with subsequent self-regulation. In their experiments, they forced participants to switch mindsets in that they had to change the way they construed events, pursued goals, communicated, made decisions and thought about themselves and others. Compared to others performing the same tasks but operating with only one mindset, participants that were forced to switch performed significantly worse than controls (Hamilton et al., 2011). The strength of this study is that the same exhaustion-effect was found across five different activities, thereby increasing its internal reliability.

As discussed above, there is considerable overlap between mindsets and time perspective to the extent that time perspectives may be considered a form of mindsets. Given the evidence presented by Hamilton et al. (2011), time perspective-switching may also be controlled by executive function and thus frequent switching of time perspectives should also have adverse impacts on subsequent self-regulation, including emotion regulation, resisting urges and refraining from impulsive behaviours (Vohs & Faber, 2007). The present research aims to investigate whether or not time perspective underpins mood states in bipolar disorder, a mood dysregulation disorder that is characterized by frequent and/or abnormally severe mood swings. If this is the case, time perspectives would switch often and exhaust executive function more severely in bipolar disorder than in healthy adults. And indeed, it is well-known and widely accepted that bipolar individuals suffer from severe executive function difficulties

(Frangou et al., 2005; Bearden et al., 2001; Qurasichi & Frangou, 2002). Impairments in cognitive set shifting (mental flexibility enabling shifting our thinking between multiple concepts simultaneously), regulated by executive functioning, are believed to be more pronounced than other cognitive impairments in bipolar disorder (Clark et al., 2002; Martinez-Aran et al., 2004). Executive dysfunction is generally attributed to structural or functional frontal cortex pathology and has been linked to a range of disorders including bipolar disorder. The term 'executive function' is an umbrella term for various complex cognitive processes. Examples of these are task-switching, planning, working memory, solving new complex problems, modifying behaviour in the light of new information, reaction inhibition, attention (-shifts), generating strategies or sequencing complex actions (Elliott, 2003). Funahashi (2001) defined it as 'a product of the coordinated operation of various processes to accomplish a particular goal in a flexible manner'. When the system breaks down or its resources are exhausted, behaviours become poorly controlled. Deficits in bipolar patients noted in previous studies include diminished verbal fluency compared to controls in remitted individuals with residual depressive symptoms (Atre-Vaidya et al., 1998; Ferrier et al., 1999), word generation performance in stable bipolar patients,

These results are not always consistent- for example, Gruzelier et al. (1998) compared verbal fluency between acutely depressed, manic and schizophrenic patients and only found deficits in schizophrenic participants. Further, Calev et al. (1989) investigated depressed, manic and remitted bipolar patients and there were no significant differences in performances across these groups. Planning ability has generally been found to be diminished in euthymic patients (e.g. Ferrier et al., 1999; Sweeney et al., 2000) and these patients may take longer to plan even where no fundamental planning deficits are measured (Rubinsztein et al., 2006). Interestingly, impulsive spending (Vohs & Faber, 2007) in healthy adults and indulgent choices when spending money (Shiv & Fedorikhin, 1999), usually characteristics of mania, have also been shown to reduce the capacity to self-regulate and have been speculated to tap into executive functions (Hamilton et al., 2011). Another executive domain is the modification of incipient emotional reactions (Vohs & Baumeister & Ciarocco, 2005; Vohs et al., 2005) and Hamilton and colleagues (2011) provided support for this to be influenced by mindset-switching as well: Healthy adults in their experiment tried to stifle emotional reactions but failed to regulate them effectively if they were forced to switch mindsets during the task they were solving. This was in contrast to those that performed the task using one mindset only. The latter group were able to stop incipient emotions from developing. Thus, controlling emotional reactions is also part of executive control, and plays a central role in bipolar disorder.

Decision-making, another executive domain, is influenced by mind-set-switching. In Hamilton et al.'s (2011) experiment, those that switched mindsets and used executive resources had difficulties making decisions compared to controls and showed less confidence in their decisions. It may be the case that time perspective takes away cognitive resources when they switch. This, in turn, may then lead to difficulties in decision-making that have been witnessed in bipolar disorder (e.g. Johnson, 2005). Should time perspective underpin bipolar mood states at the more extreme ends of the mood spectrum, it may be possible that cognitive resources are particularly drained given more frequent and intense mood-switching.

8.2.3. Self-regulation skills and Time Perspective

Self-regulation involves the capacity to modulate mood, self-calm, delay gratification and tolerate change or transitions (Dvorak et al., 2013). It is a process that impacts on any individual's everyday functioning and interpersonal relationships and is firmly linked to mental health (Bagozzi, 1992). Often, these regulation problems are life-long and underpin a variety of diagnoses. Where self-regulation issues become entrenched, individuals will struggle with mood regulation, which makes the capacity to self-regulate central to bipolar disorder. Poor regulation further impacts on the capacity to sustain attention, to motivate oneself for goal-oriented activities and the ability to tolerate high input of sensory information, change and stress (Carver, 2006). Affected individuals will often struggle with coping-skills, impulsivity and self-control. Irritability is often witnessed, which may be due to difficulties with keeping up regular sleep patterns, partly due to inapt regulation of high state of arousal. All these deficits are of central importance to bipolar disorder.

According to behavioural self-regulation theories, effortful control involves the engagement of higher order cognition in directing behaviour (Hofmann et al., 2012; Dvorak et al., 2013). Time Perspective functions on cognitive level and is, by definition, closely linked to 'self-regulation'. In fact, self-regulation is implicit in time-perspective. For example, the definition of future time perspective is the ability to delay rewards in order to attain a future goal (Zimbardo & Boyd, 1999). This temporal orientation is, for example, demonstrated in the 'Stanford Marshmallow Experiments' by Walter Mischel in the 1960s and 70s, later discussed by Zimbardo in relation to time perspective and Stanford Prison. Mischel gave 94 children a test that they always passed and rewarded each with one marshmallow. He added that if they

waited, they would receive a second marshmallow. He left the room for 15 minutes and found that 2/3 of the children had eaten their marshmallow. Mischel revisited his participants 14 years later and found that the third that had resisted temptation and waited patiently for the second marshmallow had achieved significantly higher SAT-scores (Mischel et al., 1989) in school and achieved better academic outcome (Ayduk & Ozlem, 2000). These results could be considered an example of self-regulation in that the children that resisted immediate reward, the hallmark of future time perspective, were able to regulate their impulses better than the other 2/3 of children. And these children with higher capacity to self-regulate, i.e. were higher in future time perspective, also achieved better academic success. This is again consistent with time perspective research that has linked future TP scores to academic success (Zimbardo & Boyd, 1999; Peetsma, 1994 in deBilde et al., 2011). FTP has also been linked to better time–management (Harber, Zimbardo & Boyd, 2003) and less procrastination (Jackson, Fritch, Nagasaka & Pope, 2003); all likely to be the manifestation of better self-regulation capacities. While future time perspective can be seen as the capacity to self-regulate one's behaviour, present-hedonistic time perspective may be seen as a lack of such capacity. Present-hedonistic individuals are concerned mainly with immediate reward with little concern for future consequences. The children that ate the first marshmallow right away would thus likely have scored high on the present-hedonistic scale, which is, in turn, negatively related to academic success and socio-economic status (Zimbardo & Boyd,1999). Self-regulation may thus be understood as a component measured in certain time perspectives and it is also at the core of bipolar disorder (DeGangi, 2012). One study on this issue was conducted by Zebardast et al. (2011) who asked a large sample of Iranian students to fill in the Zimbardo Time Perspective Inventory (ZTPI; 1999) and the Self-Regulation Inventory (SRI; Ibanez et al., 2005). The latter scale enables the measurement of an overall score for self-regulation, but also includes a subscale for 'wellbeing-seeking', which is related to one's aim of achieving well-being through one's own resources including the regulation of one's own behaviour.

The past-negative time perspective was negatively related to overall self-control (r=-0.374) and well-being seeking (r=-0.287). A focus on adverse aspects of one's past is thus interfering with wanting to be well and emotionally balanced, perhaps facilitated by the general inability to self-control. The present-fatalistic subscale of the ZTPI also significantly correlated with self-regulation (r= -0.24), as is expected as this particular time perspective is characterized by a lack of care for consequences and is instead related to thrill-seeking. Future TP, however, was positively related to well-being seeking (r=0.485) and has in fact also been linked to well-being and regularly attending health screenings elsewhere (Zimbardo & Boyd, 1999).

In summary, there is only limited direct empirical evidence for a possible connection between time perspective and self-regulation. However, despite the lack of more empirical evidence, certain time perspectives imply a certain level of self-regulation. Future-oriented individuals, for example, are conscientious goal-setting achievers with the ability to delay rewards (Zimbardo & Boyd, 1999). By contrast, present-hedonistic individuals are first and foremost concerned with sensation and immediate reward.

8.3. Time perspective and specific Bipolar mood symptoms

The following sections will discuss how evidence on time perspective may relate to specific symptoms of mania and depression.

8.3.1. Symptoms of mania and overlap with Time Perspective evidence

As can be seen in table 4, TP has been linked to various variables that are not specific to bipolar disorder. However, the outcome variables share overlap with the symptoms of acute mood states in bipolar disorder. The link between the TP research findings and bipolar disorder symptoms will be elaborated on in the following sections. The goal of the rest of this chapter is to establish how TP findings, such as that a present-hedonistic TP is linked to impulsiveness (Zimbardo & Boyd, 1999), may relate to bipolar disorder presentations. Mania and depression will be considered separately. All reviewed evidence for each bipolar mood state will then be considered together in order to hypothesise what time perspectives may predict each of the mood states. Based on this, the hypotheses for this thesis will be developed later on.

8.3.1.1. Impulsiveness and Time Perspective evidence

The present-hedonistic TP subscale measures a preference for present enjoyment, pleasure and excitement. It robustly correlates with ego under-control, $r\ (205) = 0.75$, $p<0.01$; novelty-seeking $r\ (204) = 0.72$, $p<0.01$; sensation-seeking, $r\ (205) = 0.72$, $p<0.01$ and most relevant to impulsivity, it negatively correlates with a preference for consistency $r\ (205) = -0.51$, $p<0.01$ (Zimbardo & Boyd, 1999).

Future TP is negatively correlated to novelty seeking, r (204) = (-0.53), p<0.01; and sensation-seeking r (205) = (-0.40), p<0.01 (Zimbardo & Boyd, 1999). Students with a future TP bias had more of an organised structure to their daily lives than their peers with different TP biases. They make to-do-lists, wear watches, use day planners and balance their check books (Zimbardo & Boyd, 1999). People with a present-hedonistic TP bias are less likely to wear wrist-watches and to have clear future goals. It might hence be hypothesized that impulsivity in bipolar disorder may be predicted by high present-hedonistic scores.

8.3.1.2. Substance use and Time Perspective evidence

Substance use has repeatedly and consistently linked to time perspective. A present-hedonistic time perspective, for example, is marked by a lack for consequences and emphasis on present enjoyment which is likely to be present in substance-users. In contrast, a future-time perspective is the opposite in that it represents a kind of conscientiousness and focus on consequences that it is linked to a healthier life style, including preferring nutrition over taste in food (Zimbardo& Boyd, 1999). It is hence likely that a low future orientation can be found in substance users. This combination of low future and high present orientation is what has consistently been found in studies. Wills, Sandy & Yaeger (2001) investigated early-onset substance use in a large sample of elementary school students in the United States. The results showed that a low future TP and high present-orientation were predictive of substance use, even in this young sample (mean age= 11.8 years). Investigating a slightly older, young adults-sample, Zimbardo & Boyd (1999) interviewed 31 college students with a specific TP biases. Again, those students with a present-hedonistic TP bias used more alcohol than their peers who scored less high on this scale, F (2, 25) = 2.60, p<0.10, n^2=0.18. Complementing this finding, Keough, Zimbardo & Boyd (1999) found that both present TP's were highly related to more frequent smoking, consumption of alcohol and drug use, predicting these behaviours positively. It should hence be expected to find substance use in bipolar disorder being predicted by a low future TP and high present-orientation.

8.3.1.3. Attention and concentration difficulties and Time Perspective evidence

Bipolar disorder is consistently linked to cognitive deficits and impairments in attention that are often less evident, though still present, in remission (Johnson, 2005; Nowack, 2013). There

is virtually no evidence on time perspective and attention and concentration issues. However, it has been hypothesized that a future time perspective might take up more cognitive resources in terms of capacity for attention and working-memory given that we switch between time perspectives depending on situational demands (Mueller et al., 2010). A future- TP is a pre-occupation with the consideration of potential future events and outcomes, as well as a calculation of chances and risks, which may further add to cognitive load. Zimbardo & Boyd (1999) suggest that this TP has many benefits, but comes at a cost in terms of not being able to 'switch off', and Mueller et al. (2010) belief that this inability to rest one's mind might be negatively related to attentional resources. However, more research would be needed to make informed predictions based on time perspectives and this aspect of bipolar disorder.

8.3.1.4. Risky behaviour, Time Perspective and Bipolar Disorder

Time perspective as a cognitive individual difference variable is believed to influence decision-making and has consistently been linked to levels of risk-taking (Zimbardo, Keough & Boyd, 1997). The acute phases of bipolar disorder are characterized by poor decision-making, often leading to risky behaviours (Levy & Manove, 2012). However, even in remission, decision-making may be impaired possibly reflecting more permanent impairment in bipolar disorder patients (Johnson, 2005). Most prominently, mania is often accompanied by excessive involvement in pleasurable activities that have a high potential for painful consequences (APA, 2013). This attitude is perfectly captured in the present-hedonistic time perspective, characterized by a lack of regard for consequences and a preference for immediate reward (Zimbardo & Boyd, 1999). Depression, by contrast, is often marked by a disruption of the decision-making process leading to indecisiveness. However, depression may also lead to a kind of fatalistic attitude manifesting itself in risk-taking behaviour, for example in the form of substance use (Swendsen & Merikangas, 2000) and suicidal behaviours (Fajutrao et al., 2009).

There are various types of risk-taking research in bipolar disorder. Prospective studies have, for example, investigated the relationship between substance use and symptom development. Several studies found marijuana use to be positively linked with manic symptom development and alcohol with depression (Baethge et al., 2005). In a different line of associated research, mania has been linked to a faulty assessment of probabilities and choosing the most likely outcome (Murphy et al., 2001), finding and maintaining a long-term strategy in the face of immediate reward (Adida et al., 2008, Clark et al., 2001, 2002) and increased sensitivity to

error feedback (Minassian et al., 2004). It is likely that this aspect of depression that is linked to risky behaviours is underpinned by a low future TP in that FTP is the ability and tendency to base current decision-making on a cost/benefit analysis that includes the simulation of future outcomes. Future TP should also be low in depression as a degree of hopelessness is inherent to both. Decision-making during depression also appears to be dependent on the severity of the episode. Several studies did not find risky decision-making in lower intensity bipolar depression (Tavares et al., 2007; Holmes et al., 2008, 2009) though Rubinsztein et al. (2000, 2006) did find impairment in probability assessment and choosing a likely outcome.

Several risky behaviours have been linked to specific mood symptoms, though the factors governing such faulty decision-making at large are unknown, with no one psychological model explaining all symptoms (Power, 2005). Available literature points at several possible underpinning factors, such as neuropsychological personality processes. One review found poor verbal memory and sustained attention across mood states (Quraishi & Frangou, 2002) and Clark & Sahakian (2006) specifically point to such deficits being more severe in mania, where risky behaviours are most common.

Executive functioning is also known to be impaired in bipolar disorder and is likely to have a large impact on impaired decision-making and impulse control (i.e. Swann et al., 2001, 2007). Leahy (1999) has proposed a cognitive model of bipolar disorder where acute phases in bipolar disorder are conceptualized to be connected to certain cognitive styles: Manic individuals are believed to be 'risk lovers' with a tendency to maximizing immediate reward and depressive individuals are believed to be 'risk averse', aiming to minimize loss. Present-hedonistic TP should by definition be underpinning mania and depression should be underpinned by the cautious Past-TP which is geared towards learning from past mistakes and outcomes in order to avoid faulty current decision-making (Zimbardo & Boyd, 1999). Closely linked to avoiding and approaching behaviour after the cognitive decision-making process may be the Behavioural Activation System (BAS), as outlined in the previous chapter in this thesis. The major drawback of risk and decision-making studies in bipolar disorder is that they are mostly conducted in computerized tasks or experiments where ecological validity is relatively low. However, the consensus in the literature appears to link faulty decision-making to both a lack in ability to judge outcomes accurately and a possible dysregulation in terms of the intensity with which rewards are approached or avoided (Power, 2005). This may reflect a general weakness in terms of simulating future events in depression that may be underpinned by low future TP scores (compare Zimbardo & Boyd, 1999). Low future TP in depression should also occur due to the often present sense of hopelessness during that phase. Additionally, there is also direct evidence that TP is linked to risky decision-making in healthy individuals

(Apostolidis et al, 2006; Fieulaine & Martinez, 2010; Laghi et al., 2012; Wills, Sandy & Yaeger, 2001; Zimbardo, Keough & Boyd, 1997). Time perspective is believed to have a direct influence on decision-making and behaviour in that the primary psychological influences that set the parameters for decision-making and subsequent behaviours are located in the preferred time frame of the individual (Zimbardo, Keough & Boyd, 1997). These general tendencies of locating the parameters of decision-making in past, present or future have powerful influences on whether we choose the 'safe' or 'risky' course of action in any given situation. A past-oriented person would, for example, be expected to take the more cautious approach if they already experienced similar situations and attached negative memories to them. Future-oriented individuals would be expected to be risk-adverse, though based on expected longer-term rewards and losses as opposed to recall of memories. Present-oriented individuals are very different in that they select a course of action based on the option that is most likely to bring immediate rewards in terms of sensation, i.e. pleasure, thrill or other positively exciting feelings. Their behaviour is less under the control of experience or consequences. Zimbardo, Keough & Boyd (1997) tested these assumptions in a large-scale cross-sectional study with 1714 students diverse in age, sex and ethnicity. Present-TP scores positively predicted risky driving behaviours, over and above previously established predictors of the same behaviours, i.e. aggression, impulsivity, and sensation-seeking. Though the latter taps into present-hedonistic attitude, present TP alone predicted risk behaviour differentially and independently. The correlations between risky driving and the present time perspective ranged from r=0.18 to r=0.33 across six subsamples of high school and university students from different universities. Risk driving included speeding, car racing, driving under the influence and taking driving risks. Future TP also predicted risky driving negatively, though the relationship was much less strong when pooled across all six subsamples, $r\ (1662) = (-0.08)$, $p<0.01$ versus $r\ (1662) =0.029$, $p<0.01$ for the relationship between PTP and risky driving (Zimbardo, Keough & Boyd, 1997). In a further independent study in this research, present time perspective also emerged as a highly significant predictor of risk driving, $r\ (205) = 0.34$, $p<0.001$. Future TP negatively predicted this behaviour, $r\ (205) = (-0.25)$, $p<0.01$, independently of present TP (Zimbardo, Keough & Boyd, 1997). Laghi, Liga, Baumgartner and Baiocco (2012) suspect that temporal focus (TP) is also related to several other actions related to health maintenance, illness prevention and risk. Substance abuse (Apostolidis, Fieulaine & Soule, 2006; Wills, Sandy & Yaeger, 2001), unprotected sexual practices (Rothspan & Read, 1996) and delinquency (Boyd & Zimbardo, 2005) all have been linked to positive time perspective in past research. Overall, present-oriented individuals appear to be more responsive to experiences that have the potential for producing instant rewards and satisfaction. However,

the consequent risky behaviours are unlikely to be rewarding long-term. Future-oriented peers, in contrast, endorse in a cost-benefit analysis before they decide on course of action that is most likely to produce longer-term rewards. Laghi et al. (2012) found further evidence for such relationships in adolescents displaying binge drinking/eating behaviours. 1350 17-19-year-old participants engaging in such behaviours reported higher past-negative TPs, lower future-orientations and greater present-fatalistic scores. Notably, these students also reported lower life satisfaction and self-esteem than peers. The authors conclude that time perspective may be a salient dimension when exploring risky behaviours.

The evidence on time perspective and risky behaviours is strong in that it relies on standardized self-report measures with good psychometric properties in terms of validity and reliability demonstrated across samples, contexts and time. However, the resulting evidence is always cross-sectional in nature, using student samples thereby limiting external validity. All available evidence is furthermore based on regression or correlation which is sometimes overstated. What is reported as a 'strong effect' in Zimbardo, Keough and Boyd (1997), for example, is actually fairly weakly correlated (i.e. r=0.33 for present TP and only r=-0.8 for future TP), leaving much unexplained variance in the relationship between risky behaviour and time perspective. However, the factors leading to the decision to engage in risky behaviours is likely to be complex and what time perspective can offer is fairly robust, or consistent results and sometimes superior predictive power of risky behaviour than other already established individual difference predictor variables, such as is the case in Zimbardo, Keough and Boyd (1997). Finally, it needs to be considered that the correlational research does not show why the behaviour occurs: For example, Laghi et al (2012) show that risky binge behaviour is also correlated to self-esteem and life-satisfaction, along with time perspective. The inferences we can make based on the relationships between TP and risk behaviour are thus limited as other variables playing a role in this connection are still unknown.

Based on the available evidence on bipolar disorder, time perspective and risk, it should be expected that manic phases are predicted positively and most strongly by present-hedonistic TP. Future TP should inversely and mildly predict mania. It should also predict depression negatively and this relationship is likely to be strong based on the reviewed evidence. Past-negative TP is also believed to underpin depression based on the cautious, indecisive approach depressed individuals appear to take.

8.3.1.5. Inflated self-esteem/grandiosity and Time Perspective evidence

Past time perspective has been consistently linked to self-esteem in healthy adults. However, Zimbardo & Boyd (1999) found that past-positive biases are correlated with self-esteem, $r(315) = 0.33$, $p<0.01$ and extraversion, $r=0.53$, $p<0.001$ (van Beek et al., 2010). Past- negative TP correlated negatively with extraversion ($r= (-0.68)$, $p<0.001$, van Beek et al., 2010). This is consistent with the very definition of a past time perspective which is marked by a cautious approach to current decision-making, based on the recall of previous experiences.

8.3.1.6. Increased psycho-motor and goal-directed activity

The future time perspective reflects a preference for goal planning and bigger long-term rewards, as well as the organization of behaviour to achieve these. Underlying this attitude is a strong reward-dependence, which is also a feature of bipolar (hypo-) mania. A future TP bias predicted more organised, goal-directed behaviour, including making to-do-lists, using day planners and wrist watches in U.S. students (Zimbardo & Boyd, 1999). Predominantly future-oriented students also reported feeling like they have less 'free time' in their lives and hence heightened pressure or stress to use their time wisely (Zimbardo & Boyd, 1999). This stress, however, resulted in bigger accomplishments than their peers, i.e. in terms of higher GPA scores, $r(27) = 0.40$, $p<0.05$. These habits would be helpful, and may therefore be more prominent, in phases of heightened goal-activity and it is hence possible a future TP could predict this aspect of (hypo-) mania. However, it is unclear how future TP relates to mania as this phase is also characterised by a tendency for risky behaviour and a degree of indifference about consequences of one's actions. Future TP, on the other hand, is showing the preference to conscientiously work towards goals. Students with a future TP bias were highly organized and ambitious goal-seekers (in Zimbardo & Boyd, 1999). It is hence unclear how future-time perspective relates to the symptom of increased goal-directed activity and may depend on the individual presentation of the manic phase experienced.

8.3.1.7. Irritability and Time Perspective evidence

Irritability is a DSM-V diagnostic criterion for manic episodes, most research on bipolar irritability focuses on adolescents. It has been considered the most controversial indicator of

bipolar status because of its association with a large array of other disorders (Kowatch et al., 2005). Still, Leibenluft, Charney & Pine (2003) stress that irritability is one of the most impairing symptoms of bipolar disorder. In a study by Goldberg and colleagues (2009a, b), 73.1% of the manic sample reported being irritable. To compare, the second most common symptom reported was distractibility- however only experienced by 37.2 %. Irritability thus seems to be extremely prevalent and perhaps the most bothersome and noticeable for patients. It is frequently reported in mixed mood states (e.g. Judd et al., 2012), but it is also common during major depressive episodes (Perlis et al., 2009) and has consistently been linked to suicide attempts (Perlis et al., 2005; Crook et al., 1975; Seidlitz et al., 2001). The presence of irritability in major depression has furthermore been suggested as a marker for potential developing bipolar disorder (Bennazzi & Akiskal, 2005) and a prodrome for (hypo-) mania (Homish et al., 2013). In a large-scale prospective U.S. study (Homish et al., 2013) 40512 non-institutionalized adults with sub-threshold bipolar disorder were given a survey at two occasions with a 3-4-year gap in between each. Among other variables, irritability at the first measurement (wave 1) was taken as an indicator for the development of a (hypo-)manic episode measured at the second measurement. The likelihood of developing a full manic or hypomanic episode by wave 2 was significantly increased when elation or irritability was reported at wave 1. If both symptoms were present at wave 1, it increased the chances of developing an acute (hypo)manic episode by 4.6. And finally, if both irritability and were accompanied by cognitive-behavioural variables such as lack of concentration, racing thoughts and increased activity/ restlessness, this made the development of (hypo-mania) even more likely. Interestingly, the presence of other features of mania did not make future episodes within the three years more likely. This evidence suggests that irritability is not just a symptom of mania, as suggested in the DSM-5, but may also be understood as a long-term predictor and prodrome of these mood states. It appears to be an integral part of the disease. However, the reported evidence by Homish et al (2013) is considerably incomplete with missing information about the actual age range of participants which is especially important in the light of research efforts around irritability usually focusing on adolescents. Drop-out rates at wave 2 were also not reported which makes attrition a potential source of bias and threat to external reliability and validity. The study's design in itself is problematic in that it only includes a one-day assessment as the basis for prediction of future manic episodes(Homish et al., 2013). It is not explicitly stated whether irritability measured a trait or transient state at the point of measurement. Internal validity might hence have been compromised. While irritability per se has not been linked to bipolar, similar variables such as trait aggression and agreeableness have. Past-negative TP, for example, has shown to have a strong relationship with aggression,

r (200) = 0.57, p<0.01 (Zimbardo & Boyd, 1999) and is negatively correlated with the Big 5 personality trait of agreeableness and emotional stability in healthy adults. This was measured with the Aggression Questionnaire (1992) containing subscales for physical aggression, verbal aggression, anger and hostility. Men scored significantly higher than women in this cross-sectional study, thus gender may be an important mediating factor in the relationship between TP and irritability, aggression or agreeableness. Overall, time perspective research is in line with what would be expected in that that the dominance of negative aspects of one's past, such as bad memories and trauma, are closely linked to the level of aggression and agreeableness experienced. A strong past-time perspective should thus be expected to underlie mania if irritability is present. A Past-positive TP, in contrast, correlated negatively with aggression, r (200) = (-0.19), p<0.05 (Zimbardo & Boyd, 1999).

Further related to aggressive tendencies is a present-fatalistic TP, or the lack of direction and the disbelief in one's capacity to change one's circumstances. PFTP correlated strongly with aggression in Zimbardo & Boyd (1999), r (200) = 0.48, p<0.01.

Based on this evidence, irritability may be predicted by a past-negative and present-fatalistic TP and negatively by a past-positive TP. However, it may not be a strong predictor specifically of mania per se as irritability is also reported in mixed and depressive episodes and feelings of euphoria may outbalance any irritability in individual presentations of mania.

8.3.2. Symptoms of Bipolar depression and Time Perspective evidence

Depression has been studied directly in relationship to time perspective, but both concepts have been linked to related notions contributing to, or buffering depression. These include concepts such as nostalgia, the sentimental longing for the past reflected also on a cognitive level in past-positive TP, or rumination that can be the expression of a strong past-focus (Zimbardo & Boyd, 1999). Additional convergent evidence comes from TP being linked to personality traits related to depression, such as neuroticism, optimism, but also individual differences in coping strategies and problem solving styles.

Perhaps most prominently and expectedly, a negative TP, the preoccupation with negative aspects of one's past, has been linked to depression and related concepts: Scores on the past-negative subscale of the ZTPI are positively related with depression, r (203) = 0.69, p<0.01; anxiety r (205) =0.73, p<0.02 and negatively with low self-esteem r (312) = -0.56, p<0.01 (Zimbardo & Boyd, 1999). Depression here was measured with the Beck Depression Inventory (1961, in Zimbardo & Boyd, 1999), a standard depression index. Unfortunately, the

directionality involved in the relationship is unclear. Beyond Zimbardo & Boyd's own research, Lyubomirsky & Nolen-Hoeksema (1993, 1998) reported a similar connection between a preoccupation with the past TP and depression. More recently, van Beek et al (2010) found a high positive relationship between past-negative TP and neuroticism, $r=0.78$, $p<0.001$, a trait contributing to worrying, anxiety and depression. The negative results with PNTP are thus consistent and generally related to negative outcomes in terms of mental health. In terms of bipolar disorder depression, based on the available evidence involving healthy adults, a high past-negative time perspective scores may be related to bipolar depression.

By contrast, a focus on the positive aspects of one's past with a warm, nostalgic attitude has been negatively linked to depression and anxiety, leading some authors to believe that past-positive TP might be a buffer or tool to fight depression (Routledge, Arndt, Sekikides & Wildschut, 2008). In a series of experimental studies, the authors induced negative affect and death salience. They reported that those individuals with high nostalgia levels showed less signs of depression after being faced with thoughts about death. They conclude that nostalgia (past-positive TP) is a meaning-providing resource that can buffer against depression. Juhl et al. (2010) replicated these findings in a further series of experiments where existential threat was induced. Low levels in pre-measured nostalgia lead to greater development of anxiety and depression after exposure to existential threat. Again, nostalgia, or high past-positive TP, appeared to buffer depression. The major drawback of such studies are the amount of possible other confounding variables, notably individual differences in other aspects of personality or coping strategies that may help buffer depression. In a slightly different line of research, Wildschut et al (2006) asked adults to write detailed descriptions of what usually triggered nostalgia and they found that bad mood was the most frequently reported trigger. Hence, nostalgia appears to be not only be a buffer, but also an active coping strategy to fight depression. Given the conceptual overlap between past-positive TP and nostalgia, similar relationships should exist between PPTP and depression-related concepts. Such was the case in a correlational study conducted by van Beek and colleagues (2010) that found further a negative correlation between past-positive TP and depression, r (-0.36), $p=0.05$; as did Zimbardo & Boyd with similar correlations: PPTP correlates negatively with depression, $r (203) = (-0.20)$, $p<0.05$ and anxiety, $r (205) = (-0.30)$, $p<0.01$ as well as positively with self-esteem, $r (315) =0.33$, $p<0.01$ (Zimbardo & Boyd, 1999). Based on these findings, it should be expected that a past-positive TP is related negatively to bipolar depression as well.

Future time perspective is also very pertinent to depression as it may be viewed as the opposite of hopelessness, a key feature of depression. Future time perspective is a striving towards goals and the organization of one's motivation, behaviour and cognitions towards these goals.

Future-oriented individuals set future goals for themselves and work towards them diligently. Underpinning their goal-orientation is a certain positive expectancy and hopefulness towards the future, manifesting itself also in a sense of agency and internal locus of control. As can be expected based on this definition, future TP has been negatively linked to depression, i.e. in Zimbardo & Boyd (1999), r (203) = (-0.24), $p<0.01$. The potentially relevant trait of anxiety was similarly negatively correlated to FTP, r (205) = (-0.17), $p<0.05$. FTP is also correlated with personality traits and strategies that may be beneficial to prevent or fight depression, such as optimism (in Zimbardo & Boyd, 1999) and emotional growth coping styles, r (125) = (-0.21), $p<0.05$, as well as active problem-solving coping, r (125) = (-0.21), $p<0.05$ (Holman & Zimbardo, 1999). Given this evidence, it is likely that future TP is negatively related to depression. However, future-orientation may not always be hopeful and connected to a sense of internal locus of control. It may instead be linked to worry, anxiety or uneasiness about the future. Such negative dimensions are almost not covered by the items on the future time perspective subscale which comprises 11 items that are capturing positive aspects of the future and only 2 items measuring negative attitudes towards the future.

Beyond the future and past time perspective, the present-fatalistic TP is also expected to be related to depression. A present fatalistic outlook is marked by a resignation and loss of sense of control over life and the outcome of one's action. And indeed, such fatalistic individuals score higher on depression

r (203) =0.45, $P<0.01$ and anxiety r (205) =0.47, $p<0.01$ (Zimbardo & Boyd, 1999). It can hence also be expected to underlie depression in bipolar disorder.

Finally, the present-hedonistic TP has not been linked to depression, but to strategies that may contribute to it, such an avoidant coping style, r (125) =0.22, $p<0.05$ (Holman & Zimbardo, 1999). The present-hedonistic person, by definition, is the fun-seeking type of personality. Along with the tendency to an avoidant coping style, this does not automatically lead to depression per se but could potentially lead to unresolved issues lying dormant leading to underlying depressive tendencies to the 'happy-go-lucky' present-hedonistic person**.** It is thus difficult to make clear predictions in terms of whether or not present-hedonistic TP also underpins depression in bipolar disorder.

8.3.2.1. Suicidality and Time Perspective evidence

The risk for suicide in individuals with bipolar disorders is an estimated 15 times higher than that of the general population (Harris & Barraclough, 1997). It may be more prominent in

depressive phases but is also a feature of mania. Approximately 10% of diagnosed individuals eventually die from completed suicide and the rates for attempts are as high as 30% (Nowick et al., 2010). Rates of suicidal ideation, however, are even higher: In adults experiencing their first mood episodes, nearly 60% reported serious thoughts about suicide (Carter et al., 2003). Many studies to date, most of them cross-sectional or retrospective, have investigated potential risk factors for suicidal behaviour. These include co-morbidities (i.e. Anxiety; Baldassano, 2006), substance use (Finseth et al., 2012), heritability (Goldstein et al., 2012), social factors (i.e. stressful life events or withdrawal; Papolos et al., 2005) and age of first depressive episode (Song et al., 2012). Prospective studies have shown that suicide attempts have been predicted by long duration of untreated illness (Altamura et al., 2010), rapid cycling (Garcia-Amador et al., 2009), previous suicide attempts (Nordstrom et al., 1995), severity of depression (Angst et al., 2001) and feelings of hopelessness (Maser et al., 2002). Hopelessness is one of the most prominent features in suicidal behaviour although this varies with age. Suicidal thoughts are, for example, more prominent in adolescents than in adults (Dean et al., 1996). It could be argued that hopelessness, by definition, is the manifestation of a low future-orientation, or FTP, accompanied by a high present-fatalistic TP. This is exactly the combination of time perspectives that Laghi et al. (2009) found to distinguish adolescents with suicidal ideation and healthy controls. Suicidal adolescents were more fatalistic and less future-oriented. These TP's comprised factor one, which best separated ideators from non-ideators. Function two, however, including future TP, Present-hedonistic TP, number of friends and mark average, served best to separate further the severe from the non-severe suicidal ideators. The draw-backs of this study is perhaps the use of self-report measures, subject to social desirability biases, perhaps particularly with adolescents (Laghi et al., 2009). A German study investigating actual suicide attempts, however, found a different pattern of relevant TP's. Those participants that had attempted suicide scored significantly higher in past-negative ad present-fatalistic TP, but lower in past-positive TP than controls (Ripke, 2002). However, the sample investigated in this study was relatively small (N=53). In an interview study with students with a future TP bias, these individuals reported wanting to live longer than their peers with different TP biases (Zimbardo & Boyd, 1999). This is consistent with the fact that a strong commitment to organized behaviour, goal-striving and agency that characterizes this TP is the opposite of the hopelessness and fatalistic mind-set that is characteristic for suicidal ideation.

Van Beek et al (2010) established clear correlations between past-positive TP and suicidality, $r = (-0.37)$, $p<0.5$ and conclude that people who are less future oriented have a higher risk of being suicidal, as it may be considered an inability to switch off anxious and depressed

thoughts. Lavender & Watkins, 2004 (in van Beek et al, 2010) assume that depressed people are 'future negative' oriented, while MacLeod et al (1993) 'add' suicidal people are likely to be low on 'future positive' TP whatever that is. However, this distinction between future-positive and future-negative cannot be made using the ZTPI (1999) and it is hence possible that this valuable distinction is lost in time perspective research and temporal theory. Suicide most often witnessed in depression in bipolar disorder but has also, less prominently, been reported in mania. It is hence more unlikely to distinctively predict either type of episode. It is a feature of bipolar disorder in general but strength and experience of suicidal behaviour in mania versus depression may also depend strongly on (residual) mood symptoms, i.e. suicidal attempts, for example, may be experienced and triggered differently in mania and depression.

8.3.2.2. Social and occupational impairment and Time Perspective evidence

There is also no direct evidence for time perspective and its relationship to the impairment in a work, academic or social setting that is characteristic for bipolar I mood episodes. There is, however, evidence on time perspective and social life variables that may be relevant in this context. Based on a semi-structured time perspective interview that Zimbardo and Boyd (1999) devised, as well as based on observations made in the student interviewee's dorm rooms, the researchers created time perspective factor 'types'. The interviews took place in the 31 participants' dorm rooms at Stanford University. The students had been selected based on a screening test where the ZTPI was handed out to a large group of students; only those with TP bias (i.e. scores above the 95th percentile on one TP, but below the 95th percentile on the other fur factors) were selected for interviews. The past-negative TP bias-type of personality is characterized by individuals having a minimal and unsatisfactory social environment. They had fewer friends, less intimate contacts than their peers in other TP bias groups and they reported taking pleasure in fewer aspects of their current lives than their peers (Zimbardo & Boyd, 1999). Students with a present-hedonistic bias communicated with family more often, $r(29) = 0.40$, $p < 0.05$. These individuals were also highly energetic and participated more in many activities and varieties of sports. A future-time perspective bias meant that these students felt more pressured for time and felt less time for making friends or spending time with them. However, at the same time, these individuals imagined it would be good to have more time for social activities and wish they could.

Present-fatalistic biases predicted not wishing you would have more time to spend with your friends in U.S. Students (Zimbardo & Boyd, 1999).

8.3.2.3. Anxiety and Time Perspective evidence

Bipolar Disorder has a particularly high rate of comorbid anxiety disorders, estimated at over 50% in some studies (Simon et al, 2004). Anxiety also predicts severity of the illness and poorer prognosis (El-Mallakh & Hollifield, 2008). Individuals with co-morbid chronic anxiety tend to have a younger age of onset as well as longer and more mood episodes (Boylan et al., 2004), higher likelihood of developing a substance use disorder (Bauer et al., 2000; 2005) and increased suicidal ideation and attempts (Baldassano, 2006). Combined, these impairments can lead to poorer quality of life, decreased social functioning and less long-term employment. It has been suggested that the anxiety might stem from the emotional instability that is inherent to bipolar disorder (Laghi et al., 2005). It may exacerbate illness severity und functional deterioration by under -investigated pathways. One such pathway could be involving cognitive functioning (Silva & Leite, 2000). High levels of anxiety can significantly compromise attentional control and decision-making, even in non-psychiatric populations (Miu, Heiman & Houser, 2008). The interplay between anxiety and cognitive impairment in bipolar disorder may further limit functional capacities. Time perspective has in the past often emerged as a significant predictor of anxiety and thus might underpin the bipolar disorder. Trait anxiety is correlated strongly and positively with Past-negative TP ($r(205) = 0.73$, $p < 0.02$) in healthy adults, as well as present-fatalistic TP ($r(205) = 0.47$, $P < 0.01$). It has also been found to be negatively correlated with future TP ($r(205) = (-0.17)$, $p < 0.05$) and past-positive TP ($r(205) = (-0.30)$, $p < 0.01$; in Zimbardo & Boyd, 1999). The negative correlation with future TP is likely to be due to the fact that this subscale mainly measures a positive, hopeful attitude towards the past. Conclusions based on this time perspective must be limited, however, since anxiety should also relate positively with a future-subscale if it included items to reflect an anxious, uneasy attitude towards the future.

8.3.2.4. Rumination and Time Perspective evidence

Rumination is the repeated, compulsive thinking about the causes and consequences of one's distress, as opposed to active problem-solving (Thomas et al., 2007; Lyubomirsky & Nolen-Hoeksema, 1993). It is hence similar to 'worry' in concept, though rumination is the obsessive preoccupation with the past, whereas worry can include the future as well. Time perspective is the dominance of the past, present and future in our current thinking and as such, rumination could be considered strong past-time perspective bias. It usually focuses on negative thoughts

about the past, which would constitute past-negative time perspective bias in the context of temporal theory. Rumination on negative affect has continuously been found to be a core mechanism in the activation of maintenance of depressive cognitive styles (Lyubomirsky & Nolen-Hoeksema, 1993). In response to negative moods or threatening events, people who ruminate on the causes and consequences of these events have more sustained negative moods and have negative attitudes about themselves and their circumstances. Within depression, rumination has predicted the onset, severity, and duration of symptoms (Johnson et al., 2008). Considerably less research has been done on rumination in bipolar disorder. Two studies to date have reported high total rumination scores in samples with bipolar disorder (Knowles et al., 2005; Thomas & Bentall, 2002). Rumination in persons with high risk of developing bipolar disorder is also correlated with current depressive symptoms (Knowles et al., 2006). Several other studies have found that individuals with bipolar disorder have higher levels of rumination compared to healthy people (Thomas, Knowles et al., 2007; Van der Gucht et al., 2009). Rumination is often associated with depressive symptoms, greater lifetime depression frequency (Gruber et al., 2011) and has been shown to prospectively predict depressive episodes (Alloy, Abrahamson, Flynn et al., 2008). But just as responses to negative affect might relate to bipolar depression, there is also reason to consider responses to positive affect in relation to mania. Continuous thinking about positive events and moods may be considered to enhance positive moods. However, this is not continuously the case in mania. Research suggests that cognition shifts that happen in conjunction with mood state shifts are problematic. For example, in mania, the response to positive affect can often be e rejection of other peoples' advice (Mansell & Lam, 2006) and a lessened ability to recall negative events (Eich et al., 1997) which is problematic for future action planning. Johnson et al. (2003, 2008) indeed found a tendency for mania-prone adults to ruminate about positive emotions compared to individuals with no history of mania, though the consequences of such positive rumination is not clear-cut. In terms of depression, Johnson and colleagues (2008) conclude that rumination in bipolar depression is just as prevalent as it is in major depressive disorder.

8.4. Summary and Conclusions: Which Time Perspective is likely to underpin which Bipolar mood state based on the available research evidence?

Temporal theory posits that we draw on all five time perspectives, but to varying extents. A balanced time perspective is necessary for switching between perspectives appropriately where changing situations demand different mind-sets (Zimbardo & Boyd, 1999). Maintaining

a balanced time perspective profile that enables such flexibility should ensure optimal, healthy psychological functioning, whereas time perspective biases are expected to lead to inflexible, maladaptive functioning in various domains of life (Boniwell et al., 2010). In terms of mood states in bipolar disorder, it should thus be expected that the acute mood episodes experienced in the course of the illness should be underpinned and predicted by extreme scores on specific time perspective subscales. However, time perspective biases are also poorly defined within temporal theory in that it is unclear how many TP biases may be present at any one time and whether these are relatively stable or can also change depending on circumstances such as the level of external stress (Drake et al., 2008).

Despite these ambiguities, time perspective theory does posit that extreme TP- scores predict instable or abnormal functioning (Zimbardo & Boyd, 1999). Based on this rationale, time perspective biases, i.e. extreme TP scores, are hypothesised to underpin abnormal moods in bipolar disorder. It is unclear whether it is one or more time perspective biases that underpin bipolar moods. It seems likely, for example, that depression would be the result of a combination of time TP subscale scores, such as a low future TP and a high present-fatalistic score. It is also unclear whether there are time perspective biases that remain even in euthymia or whether euthymia is comparable to healthy functioning in that it is underpinned by a balanced time perspective profile.

Based on the available convergent evidence on the relationship between time perspective and symptoms of mania and depression that has been presented above, the following profiles emerge:

- Past-Positive TP is consistently and negatively linked to symptoms of mania (i.e. irritability, Grandiosity, reckless behaviours). It should hence be low in mania. It is also expected to be negatively linked to depression.
- Present-fatalistic TP is also consistently, but positively, linked to symptoms of mania (i.e. irritability, substance use, reckless behaviours). However, the definition of this TP, mainly the external locus of control, should be mainly accompanying depression and is not characteristic of the goal-driven, heightened energy level often witnessed in mania. It is thus to expected to be strongly linked to depression and mildly to mania.
- Present-hedonistic TP also appears to be consistently and positively linked to symptoms of mania (social/work/academic impairment, impulsiveness, substance use, reckless behaviours). Additionally, the very definition of a present-hedonistic TP is very characteristic for the nature of manic phases. It

is hence likely to be the main and positive predictor of mania. However, it may also be weakly linked to depression, given that it is positively related to avoidant coping styles.

- Future TP is not consistently linked to manic symptoms. Some of them are underpinned by high FTP (attention difficulties, social/work/academic impairments, and increased goal-activity) and others by a low FTP (impulsiveness, substance use). It appears as though future TP may predict the perhaps more and less positive aspects (i.e. euphoria versus irritability) of mania differentially. This is particularly interesting because the ZTPI does not make a distinction between future-positive and future-negative, which might have underpinned positive and negative aspects of mania differentially as well. As it is measured in the ZTPI and this PhD study, however, it is unlikely that it will emerge as a clear predictor for mania. Instead, it should be expected to predict depression negatively, particularly because the current future-TP subscale in the ZTPI mainly captures a positive, hopeful attitude towards the future.
- Past-negative TP is mostly a positive predictor of manic symptoms (i.e. irritability, social/work/academic impairment, reckless behaviour), but it is also a negative predictor of other aspects of mania, i.e. grandiosity/high self-esteem. It has to be considered that the self-esteem and grandiosity symptom does not have a robust evidence base in terms of related TP evidence. However, again, the positive aspect of mania (inflated self-esteem) appears to be linked differently than the more negative aspects of mania (i.e. irritability). Because of this conflict, it is also unlikely that a focus on negative aspects of the past will emerge as a reliable predictor of mania. By definition, the past-negative TP is linked to adverse attitudes towards the past and may be connected to trauma or reflecting a tendency for neuroticism. It has been consistently linked to negative functioning such as anxiety, low self-esteem, low life satisfaction and is thus expected to be high in depression.

In summary, it may be expected that mania is positively predicted mainly by a high score on the present-hedonistic time perspective subscale. It should also be mildly- moderately related to a low past-positive, and high present-fatalistic scores.

Depression, on the other hand is more clear-cut in terms of the available TP-evidence. Past-negative TP should be expected to be high in depressive episodes and relate to depression

positively, past-positive TP should be low and relating to depression negatively, future TP should be low and predicting depression significantly and negatively, Present-Fatalistic TP should be highly and positively related to depression and Present-hedonistic TP should be positively, but only mildly related to depression. Based on the theoretical characteristics and definitions of each time perspective and the (in-)consistency of the available evidence considered per mood state and its symptoms, the time perspectives expected to emerge as significant predictors of depression are past-negative TP (positively), future TP (negatively) and present fatalistic TP (positively).

8.5. Research questions: Rationale

Despite the research efforts and models surrounding bipolar disorder, the review above has shown that several questions remain unanswered. A crucial problem with the current BAS Dysregulation model of bipolar disorder is, for example, that it does not allow for precise predictions of when a manic versus a depressive phase is more likely to be triggered. This is mainly due to the system relying on an appraisal process of environmental cues in relation to one's current goals that is likely to be cognitive but still poorly defined (Urosevic et al., 2008). Time perspective as a cognitive individual difference variable is believed to influence current thinking and decision-making (Zimbardo & Boyd, 1999) and this thesis aims to examine whether or not it may be a predictor of bipolar mood states. Time perspective offers a potential way of indicating how an individual may appraise their current situation in relation to their goal. For example, a future-oriented person may generally prefer larger rewards at the cost of immediate smaller reward. However, time perspective is selected in relation to situational demands and thus the same individual may choose to be more present-oriented in certain situations, and more future-oriented in others. Based on this measurable preference, behaviours are selected that could potentially be initiated by the BIS/BAS- system (Depue & Iacono, 1989). The reviewed evidence in this literature review highlighted the overlap between variables that time perspective has so far been shown to predict and bipolar disorder symptoms.

Ten research questions are now proposed in order to test whether or not time perspective may indeed be useful as a predictor of bipolar mood states. If it was a cognitive predictor of bipolar mood states, time perspective may be a useful potential addition to the BAS Dysregulation model. The hypotheses for each of the questions are based on the evidence reviewed above.

9. Research Questions

Research question 1:

Question 1 was designed to find out whether or not time perspective differs in healthy adults and adults that suffer from bipolar disorder. If there was a significant difference in time perspective between these samples, it would suggest that there might be a trait difference in TP's between individuals with normal and individuals with abnormal mood. This, in turn, would warrant further investigation into the nature of the relationship between mood and TP in bipolar disorder.

- Are the five time perspective means significantly different between symptomatic bipolar adults (only symptomatic adults of both sample 1+ 3) and healthy adults (complete sample 2)?

Hypotheses:

I. *All five time perspectives will be significantly different between symptomatic adults of samples 1 + all adults of sample 2*

II. *All five time perspectives will be significantly different between the complete sample2 and the symptomatic adults of sample 3*

III. *All five time perspectives will not be significantly different between symptomatic adults of sample 1+ and symptomatic adults of sample 3*

Research question 2:

Research question 2 aimed to establish if time perspective within bipolar disorder is also different between acute mood states and remission. This was to investigate whether TP is significantly different in abnormal mood states in bipolar disorder and recovery periods. Such differences would suggest that time perspective may indeed fluctuate in healthy and unhealthy mood states.

- Are the time perspective means of the euthymic participants of bipolar adults (in both study 1+ 3) significantly different from the TP means of the adults without a mental health diagnosis (complete study 2)?

Hypothesis:

IV. Euthymic adults and healthy adults will not differ in terms of their five time perspective means

Research question 3:

This question aimed to test part of time perspective theory. Given that time perspective in bipolar disorder has been shown to be significantly different from normal mood in research question 1, the TP values for participants in acute bipolar mood episodes should differ significantly from the ideal TP values suggested by Zimbardo & Boyd (2012).

- Are TP means of symptomatic bipolar adults significantly different from the ideal TP values conceptualized by Zimbardo & Boyd (2012)?

Hypothesis:

V. The time perspective means of bipolar adults in a manic, depressed or mixed mood phase differed significantly from ideal time perspective values

Research question 4:

This research question aims to establish whether individuals with bipolar disorder differ from ideal TP values in general, i.e. no matter in what mood state or remission, or whether their TP values return to ideal TP values when they are in remission. This question begins to answer whether TP is generally on different levels in individuals with bipolar disorder, compared to healthy individuals, or whether it fluctuates between values closer and further away from ideal TP values, which are believed to be conducive to well-being.

- Are TP means of euthymic bipolar adults significantly different from the ideal TP values conceptualized by Zimbardo & Boyd (2012)?

Hypothesis:

VI. The time perspective means of bipolar adults in a euthymic mood state do not differ significantly from the ideal time perspective values.

Research question 5:

The next step is to find out whether time perspective does not only differ between normal and abnormal mood, as well as between euthymia and acute mood episodes, but whether time perspective also differs between acute mood states in bipolar disorder, and euthymia.

- Can time perspective differentiate between (hypo-) manic, depressed, mixed mood and euthymic phases in bipolar disorder?

Hypothesis:

VII. Time perspective scores significantly differ across self-reported manic, depressive, mixed and euthymic mood states in bipolar disorder

Research question 6:

The next question is whether time perspective does not only differ between normal and abnormal mood states but can also be used to predict mood states. Time perspective has previously been shown to predict various other, unrelated variables related to behaviours. If time perspective predicted mood states in bipolar disorder, this may be used in mood-monitoring, psycho-education of patients in terms of prodromes and risk-factors, as thus in relapse prevention.

- Can time perspective predict manic, depressed, mixed and euthymic mood states in bipolar disorder?

Hypotheses:

VIII. Time perspective can significantly predict manic, depressive, mixed and euthymic mood states in adults with bipolar disorder.

IX. Present-Hedonistic TP significantly predicts mania in bipolar disorder.

Research Question 7:

To establish how useful time perspective may be in the context of bipolar disorder treatments and modelling, time perspective was compared to already established predictors of mood states in bipolar disorder, i.e. BIS/BAS sensitivity and impulsiveness. These variables were chosen based on one of the dominant theories of bipolar disorder, Gray's BIS/BAS-system

conceptualisation, and impulsiveness. The latter is one of the variables that has most consistently been related to (hypo-) mania.

- Can time perspective predict mood states in bipolar over and above other already established predictors of acute mood states in the disorder?

Hypotheses:

X. *Time perspective can significantly predict acute mood states in bipolar disorder over and above BIS/BAS activation levels.*

XI. *Time perspective can significantly predict mood states in bipolar disorder over and above impulsiveness.*

Research Question 8:

This question is a replication of the previous results to test test-retest reliability. It aims to establish whether it was sample characteristics of sample 1 or a genuine effect that was measured with research question 2 by testing it in a bigger sample.

- Can the effect observed in research question 2 be replicated in a second, independent and bigger, independent sample of adults with a bipolar disorder diagnosis (complete study 3)?

Hypothesis:

XII. *Time perspective can significantly predict acute mood states in bipolar disorder.*

XIII. *Present-hedonistic time perspective will predict manic mood*

Research Question 9:

This question is an additional question that the data collected could answer, i.e. whether or not time perspective could also predict hypomanic personality-scores. Hypomanic personality has been identified as a risk factor for developing bipolar disorder symptoms and thus this question explored time perspective as a potential predictor of a risk factor to develop bipolar disorder.

- Can time perspective predict Hypomanic Personality- scores?

Hypothesis:

XIV. *Time perspective can significantly predict hypomanic personality scores*

Research question 10:

This question is an extension of question 9 and explored which of the time perspectives is best suited to predict hypomanic personality.

- Which of the time perspectives predicts Hypomanic personality scores best?

Hypothesis:

XIV. The present-hedonistic time perspective can predict most of the variance in HPS-20 scores.

V. Methodology

10. Overall study design

This PhD consists of a series of three cross-sectional online studies. Each of these studies were conducted with independent samples collected online. The main dataset is quantitative, though this is supplemented with qualitative data extracted from participants' short optional comments they left during the study. The qualitative data are discussed for illustration purposes only. The selected quotes offer an insight into the relationship between mood and time perspective as it is *experienced* by participants. Equally, they are further evidence for the presence of this relationship that this thesis aims to primarily capture statistically.

As previously mentioned, the data were collected in three separate and independent studies: The pilot and follow-up study (study 1+3) were conducted with adults with bipolar disorder and a separate study (study 2) recruited healthy adults in order to compare time perspective's parameters in both populations. Each study used a specific online questionnaire pack that participants could access online. The samples, combination of measures used and purpose of each study are described in more detail below.

Overall, ten research questions regarding time perspective and bipolar mood states were answered across the three studies. Combined, they allow for a first overview of the relationship between time perspective and mood. The samples followed a sequential logic in that the pilot study assessed which subscales were relevant in the relationship between bipolar disorder and time perspective. Sample 1 was given the full battery of the complete measures involved. Based on the results in this specific population, only those subscales were then used in sample 3 that emerged as significant predictors in study 1. Participants in study 1 were largely recruited from UK self-help groups and online forums. Study 3 had a broader focus in that all participants were recruited online. It is possible that some of the participants from study 1 were also taking part in study 3, given that some of the same online platforms were used to recruit. The possibility of combining the samples was not considered given that there was a complete data set from the first sample that includes scores of the complete BIS/BAS- measure and the BIS-11 impulsiveness-measure, but only subscale-data of these measures in sample 3. Which subscales were used in study 3 was informed by the pilot study. Even though the same measures were used in study 1 and 3, they were not used in the same way and the full data set from both questionnaires was not obtained in both studies, e.g. only one subscale of the

BIS-11 was used. Study 3 was additionally used as a way of establishing test-retest validity for the results obtained with the ZTPI.

11. Chronology of the studies

To establish time perspective's role in bipolar disorder, three studies have been conducted. The first study was conducted as a pilot study. It consisted of 140 participants and was ran online between April 2011 and April 2012. This study will be described as 'Study 1' from here on. The purpose of this study was to establish whether or not time perspective could predict bipolar mood states in the first place, and whether or not it could explain more unique variance than two other more established predictors of bipolar mood; BIS/BAS-sensitivity and impulsiveness. The rationale as to why these factors were chosen will be explained in section 13.

Based on the results that indicated that time perspective could indeed be used to predict bipolar mood states, a larger-scale follow up was designed that added new variables. Again, the rationale for including these is presented in section 13. This will be referred to as 'Study 3' and was ran between July 2012 and October 2013. 514 participants were recruited for this sample. Roughly around the same time, between April 2012 and April 2013, a separate study was conducted with 194 adults without any official mental health diagnosis. As the scope of this project changed after the pilot study was already conducted, the research questions this PhD answered do not follow the chronology in which these samples were collected. Instead, the three samples were retrospectively used to answer a broader scope of research questions. This was due to the project starting out as a one-year research but was extended to a three-year research project after year 1. IRAS approval was originally obtained but no NHS patients were recruited for this study.

12. Procedure

After gaining approval from the Ethics Committee at the University of Edinburgh, the recruitment phase started in 2011 by contacting various organisations and self-help or support groups for individuals diagnosed with bipolar disorders. These groups included the following:

- Bipolar Scotland

- Bipolar UK
- National Alliance of Mental Illness (NAMI), as well as several independent local NAMI groups
- The International Bipolar Foundation
- Bipolar Fellowship Scotland
- Various Bipolar Support Groups on Facebook
- Daily Strength- forum
- Mindspace
- Health in Mind
- Various online Bipolar Disorder forums and platforms, such as those on patient.co.uk, turn2me.org and local UK- and US- based 'yahoo- meet up'- groups for individuals with bipolar disorder.
- Some of the participants actively found the survey while searching for 'predicting mania' on google

Permission to post a research advertisement with the link to the online survey-packs was sought from the respective website administrators. These contacts received full access to the surveys involved for their review. The link to the surveys was then posted individually on the websites listed above directly as well as through the organizations' own social media accounts, such as Twitter and Facebook. Bipolar Scotland also disseminated the questionnaire pack for the pilot study with bipolar adults in paper format by including it in their newsletter that reaches all of the organisation's subscribing members throughout Scotland. The newsletter also included an informal article about the study, as well as a link to the online version. The other organizations also posted a short description of the study, as well as the link to its online-version, on their own websites or included it in their digital newsletters to their members. Interested individuals accessed the questionnaire package online via the posted links and completed the survey at home in their own time. Once they accessed the survey, potential participants had to answer a set of questions that automatically included or excluded them from the study. The in- and exclusion criteria are listed below. Eligible participants were then given access to the online questionnaire pack. The survey could only be accessed once per IP address, thereby minimizing the risk that non-eligible participants re-entered the survey after having been excluded previously. Study 1 (pilot study) and 3 (follow-up study) required adults with a diagnosis of any type of bipolar disorder. However, all questionnaires were self-report scales. In an attempt to minimise the risk that individuals with no diagnosis of bipolar disorder would fill in the survey (i.e. falsely reporting that they did have a formal diagnosis), the link

to the study was only posted on forums that should attract bipolar individuals, such as bipolar support groups. To further minimize the risk, individuals were also asked to state the type of their diagnosis and the medication they were taking.

After completing the study, participants were given the option of leaving an email address to which the results of the pilot study, along with debriefing information about its purpose, would be sent. This was done in the form of a flyer, explaining the concept of time perspective and its potential link to mental health, as well as the basic results of the pilot study. Participants who took part in the pilot study were also invited to leave their email addresses in case they wished to be contacted in the future for the follow-up study (study 3). During recruitment for study three, these participants were then invited via email.

After the recruitment phase, the statistical analysis was conducted in IBM SPSS 22 (2013).

The main search for literature was conducted between September 2010 and September 2012. These were carried out online using the following platforms: ScienceDirect, PsychInfo, PubMed, Scopus, SAGE Pub, University of Edinburgh 'Searcher'/DiscoverEd, Web of Science. In the main search, the words 'Time Perspective' 'Bipolar Disorder AND time perspective' 'Time perspective AND mental health', 'ZTPI AND bipolar disorder', 'time perspective AND well-being' and 'Balanced time perspective' were used. The titles were used to initially screen papers, followed by the abstracts. A Science-Direct alert was set up for 'Time Perspective' and the manual literature search continued until 2014.

13. Measures

Each of the three studies used a different combination of the measures described below. Since the main purpose of this PhD was to investigate the link between time perspective and mood, the two core measures were A) the Internal State Scale (ISS; Bauer, 1991) and B) the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). This study was conducted in two phases, the first study included the ZTPI and the ISS, as well as two other potential predictors of bipolar mood: Impulsiveness and BIS/BAS sensitivity. The latter were chosen in order to compare their unique contribution to the variance in mood scores to that of time perspective. The rationale behind choosing these over other potential predictors will be discussed in more detail below after introducing the measures. The follow-up study (study 3) was conducted after reviewing the results of study 1 and aimed to introduce additional variables based on theoretical grounds to establish whether these could add to the amount of variance explained when combined in a regression model with time perspective. The overall

aim was to increase the amount of variance in mood scores that could be explained by a regression model including time perspective.

In sample three, data was also collected with the Interpersonal Support Evaluation List (ISEL, Cohen, Mermelstein, Kamarck, & Hoberman, 1985) and the Brief Self Control Scale (BSCS; Tangney, Baumeister, & Boone, 2004) with the view of building a model around time perspective and other variables relevant to both bipolar disorder and time perspective. Self-control has previously shown to mediate the relationship between time perspective and other variables, such as risky behaviours (see Zimbardo & Boyd, 1999). Interpersonal support was considered as an addition to TP as an individual difference variable as a way of capturing the interplay between factors specific to the individual, and factors linking these with external, environmental factors relevant to bipolar disorder. The measures were not used in the final analysis given that many participants commented that they found it too difficult to focus for long enough to complete the study and left the survey. Participants were asked to answer the BSCS and ISEL at the end of the follow-up study which was estimated to take up to 40-45 minutes to complete in total. Where measures were completed, more than 45 % of the participants either finished the survey before completing the BSCS or the ISEL or showed obvious floor or ceiling effects (e.g. only '1' selected for every question). The measures were subsequently removed from the analysis.

13.1. Internal State Scale (ISS; Bauer, 1991)

The Internal State Scale (Bauer et al., 1991) is a self-report scale that is designed to measure current mood states, with the capacity to screen for bipolar spectrum symptoms.

It was designed as a simple and short instrument that could be administered repeatedly to capture fluctuations in mood and could easily be used from remote places. It hence lends itself particularly well to daily mood screenings or to track rapid cycling. It is designed to detect any current symptoms that participants have felt over the last 24 hours.

The ISS comprises 15 items on four subscales:

- Activation (5 items)
- Well-being (3 items)
- Perceived Conflict (5 items)
- Depression (2 items)

The activation scale reflects a heightened sense of behavioural and cognitive activation, for example rapid thoughts, restlessness and impulsivity. The perceived conflict scale measures irritability, suspiciousness, and instability of mood. It is indicative of global psychopathology. The well- being questions reflect a feeling of psychological well-being and the depression subscale measures severity of depressive symptoms. To screen for mood states, only the activation and well-being subscales are used. This was done in the current study according to the cut-off points suggested by Bauer et al. (1991). The activation scale is designed to catch manic symptoms, based not on euphoric moods but on behavioural activation, i.e. irritability or restlessness. This subscale has demonstrated correlations with other measures of mania, ranging from 0.41 to 0.60 and rates of correct classification ranging from 0.55 to 0.78 (Altman et al., 2001; Bauer et al., 1991; Bauer, Vojta, Kinosian, Altshuler & Glick, 2000; Cooke Krueger & Shugar, 1996). The ISS cut-off scores that were used for this study are the original cut-off scores recommended by Bauer (2008) and are summed up in table 5.

Table 5: ISS cut-of scores used in this PhD

Mood State	Activation Sub-Scale Score	Well-being Sub-Scale Score
(Hypo)Mania	≥ 155	≥ 125
Mixed State	≥ 155	< 125
Euthymia	< 155	≥ 125
Depression	< 155	< 125

13.1.1. Rationale for including the ISS

The central question this thesis aims to answer is whether or not time perspective may be used to predict bipolar mood states. Given that the data was collected online, a valid and reliable self-report measure of current mood was therefore needed to establish what mood each participant was experiencing at the time of participation in the study. The ISS in particular was chosen for fulfilling these criteria, as well as its psychometric properties discussed below.

13.1.2. Evaluation of the ISS

The psychometric properties of the ISS are consistently so robust that it is a widely-used, standard measure in mood research (i.e. Bauer et al., 1991; Cooke et al., 1996; Bauer et al., 2000). All subscales have been validated against clinician-rated symptoms severity and against clinician-assigned mood state evaluations. The four subscales have high inter-item consistency. Test-retest reliability during the same mood state is also reported to be good in these studies. However, scoring algorithms have varied across studies, as have means and standard deviations (Altman et al., 2001; Bauer et al., 1991). Altman and colleagues (2001) further found a low sensitivity to manic symptoms at the time of hospitalization. They highlight further issues with the measure by comparing it to their own scale (the Altman Rating Scale). In their review, the ISS is roughly half as efficient in terms of sensitivity to specifically acute manic symptoms compared to the Altman Self-Rating Mania Scale (ASRM, in Altman et al., 2001). However, their sample was very small (n= 31) and 15 of the 31 participants were either asymptomatic or presented with mild symptoms though the success rate of the ASRM was calculated for the remaining participants with acute (=moderate to severe) symptoms. By contrast, Cooke et al. (1996) conclude their comparative study by asserting that the ISS is a valid measure particularly of the severity of manic and hypomanic states and may even be more sensitive than the widely used Young Mania Rating Scale (Young et al., 1978) to fluctuations of mood in euthymic and hypomanic phases. It may be argued that each of the scales is more or less sensitive to bipolar symptoms depending on their severity. The ASRM was tested in patients with acute symptoms while the ISS was most successfully applied in populations with milder to moderate symptoms. Despite these problems, internal validity is reported to be good with Cronbach's alpha ranging between 0.81 to 0.92 (Bauer et al, 1991). The ISS is generally seen as extremely useful for crossectional designs as it is not relying on the continuous and reliable assessment by clinicians (Cooke et al., 1996). A further strength of the ISS for self-report studies is highlighted by Shugar et al. (1992) who were able to demonstrate that the self-report style of this measure is suitable even for those that are experiencing disturbance due to acute mania or depression. Good correlations with standard clinician administered scales for mania and depression have been reported with ISS subscales in both inpatients and outpatients with bipolar disorder (Bauer et al., 1991), including patients with rapid cycling (Cooke, Kuger & Shugar, 1996).

13.2. Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999)

The Zimbardo Time Perspective Inventory (Zimbardo &Boyd, 1999) is a 56-item self-report measure designed to assess a person's time perspective (TP) profile containing of five relatively independent, though conceptually related subscales:

- Future (13 items),
- Present-Hedonistic (15 items),
- Present-Fatalistic (9 items),
- Past-Positive (9 items) and
- Past –Negative (10 items).

These subscales measure both the dominance of each time frame in respondents' current thinking as well as their attitude related to each temporal orientation. Example items include the following: "I complete projects on time by making steady progress" and "Fate determines much in my life". These are rated on a Likert scale from (1) 'very-non characteristic for me' to (5) 'very characteristic for me'. The answers result in five individual subscale scores; the higher the score, the stronger is the orientation towards the specific time perspective. Zimbardo & Keough & Boyd (1997) noted that TP should be approached multidimensionally, that is the five subscales are related and need to be studied in conjunction with each other, not separately, although the time perspectives function relatively independently of each other. High scores on one subscale has no implications for scores on other subscales.

13.2.1. Rationale for including the ZTPI

This thesis is investigating time perspective as conceptualised by Zimbardo & Body (1999) as a core concept, applied to bipolar mood. The ZTPI has produced a large pool of data and evidence surrounding the concept of time perspective (Milfont et al., 2008) and has been used in all of the studies used as evidence in this thesis. The more detailed rationale for using time perspective in the context of bipolar mood has been discussed elsewhere (see chapter I).

13.2.2. Evaluation of the ZTPI

The ZTPI is the result of many years of extensive exploratory and confirmatory factor analyses with various samples, cultures and ages. It is empirically derived and includes theoretical analyses of the concept by the authors, interviews, focus groups, repeated factor analyses, feedback from experiment participants, discriminant validity analyses and item analysis and revision of items to increase internal consistency. As a result, the ZTPI is generally reported to have sound psychometric properties across studies. The five factor structure was derived and supported using exploratory and confirmatory factor analyses and inter-scale correlations were generally low (Zimbardo &Boyd, 1999; Worrell &Mello, 2007). During its development, the ZTPI also underwent vigorous convergent and discriminant validity testing and reliability testing across six samples.

A point of criticism has been that the samples Zimbardo & Boyd used were mostly college-aged participants. However, subsequent research validated the measure extensively in adult age samples, across contexts and cultures. Several reviews of time perspective instruments have found the internal reliability of the ZTPI to range from 074. To 0.82 (i.e. Laghi et al., 2009; Apostolidis, Fieulaine & Soule, 2006; Baumann & Odum, 2012; Milfont & Gouveia, 2006) and reported validation across cultures and domains (D'Alessio et al. 2003; Milfont et al., 2008). Validity was demonstrated in the German (Brandler and Rammsayer, 2002: Milfont and Bieniok, 2008) and Portuguese (Milfont et al., 2008) version, as well as further translations, and it appears to have cross-cultural equivalence (Sircova, 2007). Anagnostopoulos & Griva (2012) reported satisfactory internal validity with Cronbach's alpha values for all five scales ranging from 0.71 to 0.85 in a Greek sample. They also validated the five factor structure. In a French sample, the alpha values ranged from 0.70 to 0.75 (Fieulaine & Martinez, 2010), further giving confidence in the robust psychometric properties of the ZTPI. An issue that has not been solved until now surrounds some controversy around the five factor structure of the ZTPI. As stated in Milfont & Gouveia (2006), there is substantial evidence for the factor structure of the original ZTPI. However, recent research efforts have challenged this view and suggested different versions of a potential sixth factor (e.g. Worrell & Mello, 2007). These scales are usually new types of future-subscales. Though they have all been validated by confirmatory factor analyses, each suggestion of what this new future subscale should entail is slightly different and perhaps as a consequence, none of these scales had considerable application in research. The original ZTPI remains the standard measure used in current time perspective research.

13.3. BIS/BAS Scale (BIS/BAS; Carver & White, 1994)

The Behavioural Inhibition and Activation scale (BIS/BAS; Carver & White, 1994) is a self-report survey comprised of 20 items answered on a Four-Point-Likert scale. They are designed to measure the sensitivity of both the BIS and BAS system (Vohs & Faber, 2007) that are believed to act antagonistically in motivating approach or withdrawal behaviour in response to reward or threat. This BIS/BAS system is underpinned by an identified neurological network. Carver and White constructed the items based on their overall understanding of this system and its role in generating emotional reactions (Voigt et al., 2009). The scale is comprised of one BIS subscale (7 items) and three BAS subscales:

- BAS drive (4 items relating to strong and quick goal pursuit; e.g. I go out of my way to get things I want",
- BAS reward responsiveness (5 items relating to receptiveness to reward; e.g. "It would excite me to win a contest") and
- BAS fun seeking (4 items relating to desire for new rewarding experiences; e.g. "I crave excitement and new sensations").

All three of them can be used to form a single total score but in line with Ross et al.'s (2002) and Voigt et al.'s (2009) suggestion, they analysed on subscale level in this study. The BAS scales in particular measure sensitivity to reward and are often associated with risky behaviour. It focuses on responding with positive affect when faced with reward or incentives. The BIS scale, on the other hand, measures the tendency to respond with negative affect in response to fear or threat.

13.3.1. Rationale for measuring BIS/BAS Sensitivity

The pilot study of this PhD was designed with two main goals in mind: It aimed to establish whether or not time perspective can predict acute bipolar mood states, and whether or not it can explain more unique variance in the outcome variable than other more established predictors of acute bipolar mood states. Two predictors were chosen to compare TP to in a regression model for this purpose; one of them being BIS/BAS sensitivity. This concept specifically has been chosen because it is arguably one of the most established approaches to

predicting bipolar mood (Alloy et al., 2008; Depue & Iacono, 1989; Johnson et al., 2012) in that it has produced a large pool of evidence over the last decades. It has the advantage of being grounded in bio-psycho-social theory, the BAS Dysregulation model, that is particularly scientifically compelling as it is able to accommodate and integrate various strands of research on bipolar disorder on how mood episodes may develop. BIS/BAS sensitivity is able to predict both mania and bipolar depression differentially and prospectively, as well as retrospectively (Alloy et al., 2008). Alloy and colleagues (2008, 320) conclude that there is now "strong evidence" that (hypo-) mania and bipolar depression can be predicted by BIS/BAS- sensitivity. Both time perspective and BIS/BAS sensitivity are individual difference variables believed to influence decision-making and the regulation of behaviour, making both concepts closely related and relevant to bipolar disorder. Moreover, both concepts may be monitored and used to predict mood prospectively.

In summary, BIS/BAS sensitivity is chosen as a predictor of bipolar mood to compare time perspective to for three main reasons: It is based on bio-psycho-social theory directly relevant to the development of bipolar mood episodes, it can predict both (hypo-)mania and depression differentially and it may be one of the approaches to bipolar mood prediction that is most compatible with time perspective (Alloy et al., 2008; compare chapter III of this PhD). Comparing time perspective's ability to predict unique variance within mood state predictions in bipolar disorder may give an indication of how valuable TP may be in predicting bipolar mood, compared to already established approaches.

13.3.2. Evaluation of the BIS/BAS Scale

The BIS/BAS scales devised by Carver and White (1994) are often deemed to be the most successful and popular self-report scale to measure BIS/BAS activation. Overall, good levels of internal consistency and predictive validity are reported as well as high Cronbach alpha values (Carver & White, 1994;). Convergent and discriminant validity has also been established comparing the scales to other measures of extraversion, trait anxiety, positive affect and novelty seeking (Carver & White, 1994; Jorm et al., 1999; Heubeck et al., 1998). Test- retest reliability coefficients were also high for the BIS subscale (r=0.81) and moderate for BAS (r=0.50 for BAS total, 0.44 for Reward responsiveness, 0.81 for Drive, and 0.49 for Fun-seeking) in Meyer, Johnson & Winters (2001). The scale is sometimes criticized for only producing mixed results in the question regarding a two- factor versus four-factor structural

model but there appears to be emerging consensus in favour of the existing four factor model (Ross et al. 2002).

13.4. Barratt Impulsiveness Scale (BIS-11; Patton, Stanford & Barratt, 1995)

The Barratt Impulsiveness Scale (Barratt, 1959, in Patton et al., 1995) is a 30 item self-report instrument to measure the personality and behavioural construct of impulsiveness. It is currently in its 11th revision (Patton, Stanford & Barratt, 1995). It was originally developed in an attempt to relate anxiety and impulsiveness to psychomotor efficiency and is likely to be the most widely used self-report scale for measuring impulsiveness in both a clinical and research setting (Stanford et al., 2009). Based on a review of several factor analysis studies, Barratt worked from the assumption that impulsiveness was not a uni-dimensional construct. The BIS-11 consists of three non-overlapping sub-traits that enable discovering more differentiated relationships to different clinical symptoms:

- Attentional Impulsiveness (Inability to focus)
- Motor Impulsiveness (acting without thinking)
- Non-planning Impulsiveness (lack of 'futuring' or forethought)

An overall impulsiveness score may also be calculated. The items are rated on a 4-point- Likert scales from 1 (=rarely/never) to 4 (=almost always). There are no official rules as to what classes as normal or abnormally high impulsiveness though several studies have used a BIS-11 total score of one standard deviation above the mean (see Patton et al., 1995). Individuals with these scores show higher aggression, a greater variability of performance and faster cognitive tempo (Lawrence & Stanford, 1999).
A more recent review of an updated pool of research from the past five decades recommends a cut-off score of 72 (or higher) should be used to class individuals as highly impulsive (Stanford et al., 2009), while scores between 51-71 should be thought of as the normal limits of this trait. Scores lower than 52 reflect ego over-control or dishonesty in answering the scale (Helfritz et al., 2006).

13.4.1. Rationale for measuring impulsiveness

Impulsiveness was chosen as a predictor to compare time perspective to for two reasons: First, it has been described as one of the most fundamental core factors of bipolar disorder (Swann et al., 2001) and second, it shares great conceptual overlap with time perspective. More specifically, the present-hedonistic TP underpins a thrill-seeking attitude with little or no care about potential long-term consequences of one's action (Zimbardo & Boyd, 1999). The present-hedonistic TP is likely to lead to behaviour geared towards immediate reward and pleasure and has been linked to the Big-5 personality trait of impulsiveness (Zimbardo & Boyd, 1999). Given that time perspective and impulsiveness appear to be very similar, comparing time perspective's performance as a predictor of bipolar mood to that of impulsiveness should be a good indication of whether or not time perspective can explain more or less unique variance than the more established predictor of impulsiveness.

13.4.2. Evaluation of the BIS-11

Arguably the most commonly used administered self-report measure for assessment of impulsiveness in clinical settings and research (Stanford et al, 2009) and deemed as 'excessively validated' (Swann et al., 2001). It has demonstrated validity in several neuropsychiatric populations including bipolar disorder and correlates with other measures of impulsivity-related behaviours (Simon et al, 2004). High internal consistencies have been reported with Cronbach alpha values of 0.79 (BIS total) in Someya et al (2001) and test-retest reliability of 0.80 (Ortony & Turner, 1990).

13.5. Interpersonal Support Evaluation List (ISEL-12, Cohen et al., 1985)

The original International Support Evaluation List is a 48-items self-report scale made up of four subscales with 12 items each. These measure the perceived availability of four relatively independent social support resources:

- Tangible Supportive (Perceived availability of material aid)
- Belonging Supportive (Perceived availability of groups one can identify and socialize with)
- Self-esteem Supportive (Perceived presence of others individuals feel they compare favourably with)

- Appraisal Support (Perceived availability of someone to discuss important matters with)

The shorter version, the ISEL-12, is used in this thesis and consists of 12 items, including "There is someone I can turn to for advice about handling problems with my family" and "If I wanted to have lunch with someone, I could easily find someone to join me". Each item is a statement participants rate from 1 (=definitely true) to 4 (=definitely false); the higher the scores, the higher the perceived support. Cohen and Wills (1985) constructed the scale based on the stress-buffering hypothesis of social support. This assumption required a measure of social support that assesses the availability of multiple, relatively independent support functions. Hence, each subscale should be measured separately for research purposes, as opposed to calculating total scores.

13.5.1. Rationale for measuring interpersonal support

Time perspective alone may only explain a relatively small amount of variance in mood state predictions, given that it is a cognitive variable and as such, it is likely to only be part of several factors influencing the development of mood episodes. Levy & Manove (2012), synthesizing the available evidence on the course of bipolar disorder, conclude that biological, psychological and social factors must be considered when considering what determined the course of the disorder. The BIS/BAS element of this study accounts for biological underpinnings of mood, time perspective may account for part of the cognitive underpinnings of the development of mood episodes and interpersonal support was chosen to measure a potential social influence that may have an influence on affect regulation in bipolar disorder. Interpersonal support has been called a "central" aspect in the course of bipolar disorder (Johnson, 2005).

13.5.2. Evaluation of the ISEL

Internal consistency for the ISEL has been reported to be adequate with alpha value of 0.87 in Dyck & Holtzman (2013). In addition, confirmatory factor analysis supported the utility of the four ISEL subscales and total score (Brookings & Bolton, 1988). Convergent and discriminant

validity have been established through comparisons with other measures of social support and social anxiety (Cohen & Hoberman, 1983).

There is some debate around the underlying structure of the scale. The four subscales are believed to be relatively independent of each other, though the total score implies that a single factor model is also valuable. Furthermore, high correlations have been found between the appraisal, belonging, and self-esteem subscales in the general population (Cohen et al, 1985), which led Kash et al. (2002) to conclude that the scale might actually only differentiate between two independent support functions, tangible versus others. It also raises the possibility of a possible higher order structure. Given that the ISEL was designed to test the stress buffering model and that this requires the measurement of several sources of perceived support, the question surrounding the factor structure is an important one.

13.6. Brief Self-Control Scale (BSCS; Tangney, Baumeister & Boone, 2004)

The brief self-control scale is designed to measure a single trait construct, namely the tendency to be disciplined and resist impulses. It is a shorter, 13-item version of the self-control scale (SCS) that was developed to measure five domains of control: controlling thoughts, controlling emotions, controlling impulses, regulating behaviour/performance, and habit-breaking. In Tagney et al.'s (2004) own research, however, the five factor structure of self-control emerged that was ultimately adopted for the design of the scale. On a four-point- Likert response format, respondents are asked to indicate the degree of agreement with statements that include "I have a hard time breaking habits" and "I have trouble concentrating" Higher scores indicate a higher level of self-control.

13.6.1. Rationale for measuring self-control

Self-control has been shown to have the ability to reverse the effects of time perspective. For example, in a study by Apostolidis et al. (2006), students with a predominantly present-hedonistic time perspective were found to place less emphasis on their academic career. Their grades were significantly lower than those of their future-oriented peers. However, in a task designed to increase their sense of self-control, they they were able to outperform more future-oriented students. Similarly, Mello & Worrell (2006) found that future TP increases academic performance. However, this relationship appeared to be mediated by self-reported self-control.

A sense of agency is likely to impact on decision-making and may thus impact significantly on time perspective predicting outcome variables (Apostolidis et al., 2006).

13.6.2. Evaluation of the BSCS

Maloney et al. (2012) reviewed 60 studies that measured self-control with the SCS or BSCS with the vast majority using the brief version. Several authors provided evidence for the reliability and validity of this measure (Carver, Sinclair & Johnson, 2010). Questions regarding its unidimensionality and validity still remained, however. Maloney et al. (2012), for example, argue that it may be beneficial to look at self-control as a multi-facetted concept instead of just one construct. Nevertheless, the self-control scale has been argued to be "one of the most reliable and widely used self-control scale in the past decade" (Tittle, Ward & Grasmick, 2003, 23). Internal consistency of this scale using a single, uni-dimensional concept by calculating a single score, has been high with Cronbach alpha scores of 0.80 (Chui & Chan, 2013). In contrast, Cronbach alphas for the subscales in Chui & Chan's (2013) study yielded smaller values ranging from 0.62- 0.79, giving confidence in using self-control as a single score. Bearing in mind that Cronbach's alpha is dependent not only on the magnitude of the correlations among items, but also in the number of items the present study will calculate a single self-control score.

13.7. Hypomanic Personality Scale (HPS-20; Meads & Bentall, 2008)

The Hypomanic Personality Scale was developed by Eckblad & Chapman (1986) to identify gregarious and overactive behaviour styles characteristic of hypomania and to indicate potential risk for developing bipolar disorder. It captures sociability, high ambition and self-esteem, positive affect, increased energy levels and self-perceived individuality and creativity. The original scale consists of 48 true-false items and is a self-report measure. Scores range from 0 to 48 and are scored using deciles, upper-decal (high-HPTs>31) act as a predictor of BP symptoms and hypomanic episodes short-term (Eckblad & Chapman, 1986) and detects a greater risk of clinical mania and BP long term (10-13 years follow-up, Kwapil et al., 2000). However, for the purpose of this study, the shorter version of the scale, the HPS-20 developed by Meads & Bentall (2008) was used. Example items include "Sometimes ideas and insights

come to me so fast that I cannot express them all" and "I would rather be an ordinary success in life than a spectacular failure" (If false-rated, this indicates hypomania).

13.7.1. Rationale for measuring hypomanic personality

Hypomanic personality has previously been linked to a heightened risk for developing bipolar disorder (Kwapil et al., 2000). This measure was added to establish whether time perspective could not only predict acute bipolar episodes, but also risk to developing the condition. Moreover, the aim of this thesis was to establish whether or not time perspective may predict mood. Bipolar disorder was chosen as the most extreme ends of the mood spectrum may be present in this condition and thus, if time perspective does underpin mood, this effect may be most measurable in affected individuals. If time perspective was also able to predict hypomania, a mood state less intense than full-blown mania, this may give further confidence to the idea that time perspective may in fact be useful as a predictor for a broader mood spectrum than just the most extreme mood states of depression and mania.

13.7.2. Evaluation of the HPS-20

The hypomanic personality scale (HPS) is one of the most commonly used questionnaires to assess hypomanic personality traits. It has traditionally been used to identify individuals at high risk of developing bipolar disorder (Meyer, 2002).

Among a student population, test-retest reliability was shown to be high (Eckblad & Chapman (1986). The measure was validated in a student population against clinician ratings and standardized diagnostic assessments. High scorers were significantly more likely to have experienced hypomanic episodes and depressive symptoms, drug and alcohol use, and psychotic-like symptoms.

A longitudinal study of 36 high scorers on the HPS and 31 controls followed the groups for 13 years (Kwapil et al, 2000). As predicted, significantly more high scorers than controls developed bipolar disorder (25% in the high scoring group versus none in the low scoring group) and experienced a major depressive episode (28% in the high scoring group versus 19%in low scorers). High scorers also had more severe psychotic-like symptoms, borderline personality disorder symptoms and substance abuse disorders relative to the controls. A recent German study found that the HPS was more effective in ascertaining individuals with a history

of hypomanic or manic episodes than those with a history of depressive episodes (Meyer & Hautzinger, 2003). Eckblad & Chapman (1986) reported good internal consistency (a=0.87) and 15-week test-retest reliability (r=0.81). Good internal consistency was obtained for this investigation (a=0.72). Though the scale is widely used, there has been surprisingly little research into its factor structure. Meads and Bentall (2008) aimed to reduce its factor structure and items using Rasch analysis. The result was the HPS-20, retaining the scope of trait coverage of the original version (Meads & Bentall, 2008). The HPS and HPS-20 correlated at 0.94 (n=299) in Meads and Bentall (2008) and those considered high or low scorers in the HPS remained in their respective groups also when filling in the HPS-20 instead. The HPS-20 reduced the number of items statistically and is expected to be more precise than the original version due to the exclusion of redundant items.

13.8. Reliability analysis for each scale in the current analysis

The Cronbach alpha values were calculated for each subscale of the measures above, per study in the current research, as a general indication of internal consistency of each questionnaire. Internal consistency is especially important if the variables are used in subsequent predictive analyses, as is the case here. Scales with low reliability may indicate poor fit or relevance for the population it was used in. However, it needs to be kept in mind that Cronbach alpha values heavily depend on the samples and constructs themselves. Kline (1999), for example, argues that lower alpha-values than the typical 0.7 cut-off point need to be expected, simply due to the diversity of constructs being measured. Cortina (1993) further notes that Cronbach alpha also heavily depends on the number of items in the subscale in question. This is due to the fact that part of the equation to calculate Cronbach's alpha is based on the number of items per subscale squared, i.e. the larger the number of items, the larger this value is. Cronbach alpha values reached from 0.69 to 0.84 in sample 1, from 0.72 to 0.82 in sample 2 and from 0.56 to 0.9 in sample 3.

14. Overview of the three samples involved in this research

14.1. Study 1

14.1.1. Primary Purpose of Study 1

- Pilot Study
- Designed to test whether time perspective can statistically differentiate between mood states in bipolar disorder
- To test whether or not time perspective statistically predicts mood states in bipolar disorder, and could potentially be valuable in that it can predict such moods over and above already other known predictors of bipolar mood episodes, i.e. BIS/BAS sensitivity and impulsiveness

14.1.2. Sample 1 (N=140)

237 participants with a self-reported diagnosis of bipolar disorder started the online-survey between February 2011 and April 2012.
According to the inclusion criteria, participants had to confirm to

- have a formal diagnosis of a type of bipolar disorder
- be between 18 and 65 years old
- be fluent in English
- have no learning disability and they had to
- have answered at least 90% of all questions or more.

After these criteria were applied, 140 cases remained in the sample. 77.9 % were female (N=109) and 22.1% were male (N=31) with a mean age of 42.5 years, SD=11.26. Most of the participants came from the UK (N=61) and the USA (N=58). For a complete list of countries of permanent residence (see section 32 for full details). All but 24 participants reported to be on at least one type of medication related to bipolar disorder.
49 participants stated they were diagnosed with bipolar II, 29 reported to have a bipolar I diagnosis, 10 stated 'bipolar not otherwise specified' and the rest of the participants gave

insufficient information, e.g. only stated ‘manic depressive disorder’ instead of naming their subtype.

According to the ISS, 44 participants were experiencing (hypo-) mania, 33 currently experienced depression, 44 reported mixed moods and 19 participants reported to be euthymic.

14.1.3. Measures

- Zimbardo Time Perspective Inventory (ZTPI)
- Internal State Scale (ISS)
- Barratt Impulsiveness Scale (BIS-11)
- BIS/BAS Scale

+ Additional Non-standardized questions, including demographics, type of bipolar disorder/ medication, DoB, sex.

+ Participant Information Sheet + Informed Consent Sheet

14.1.4. Missing Values

Some of the data of the pilot study was missing. Where more than 10 % of their response was missing, these cases were excluded. To compare, Graham (2003), suggest that a rate of over 25% of missing values is classed as *high*, while Arbuckle (1996, both in Tabachnick and Fidell, 2007) warns that anything above 20% of values are missing may cause substantial bias in estimates. However, the threshold of maximum allowed missing values was set at 10% in the present study, following a more conservative approach. 140 cases remained in the analysis after applying these criteria, 39 of which had missing values, with an average of 2.28 missing values out of 125 items in the questionnaires per case (M= 2.28, SD= 2.04). The exact number of missing values per case can be seen in table 3. In order to prepare the remaining 140 cases for statistical analysis in IBM SPSS 22 (2013), an analysis of missing data was conducted. Before replacing missing values with the expectation maximization technique (EM), a Little’s MCAR test was performed to determine whether or not the values were missing at random or not. Little’s MCAR test was non-significant, Chi-Square= 5947.586, df= 5890, p= 0.296. Hence, the null-hypothesis was not rejected, implying that the data is, in fact, missing at random. The expectation maximization technique was then used to replace the missing values

in the data set. This was done separately for each subscale of all measures to increase the correlations between the items, which makes the estimation of values more accurate.

14.2. Study 2

14.2.1. Primary Purpose of Study 2

- This study was designed to investigate whether time perspective functions differently in healthy adults compared to adults with bipolar disorder and to investigate the nature of potential differences or similarities in terms of time perspective in these two groups.
- To answer whether or not time perspective can also predict hypomanic personality, i.e. risk for developing bipolar disorder

14.2.2. Sample 2 (N=194)

Between April 2012 and April 2013, 266 participants started the survey. According to the inclusion criteria, participants had to confirm to

- have no formal diagnosis of any kind of mental illness
- be between 18 and 65 years old
- be fluent in English
- have no learning disability

After these criteria were applied, 194 cases remained in the sample. 54.1 % were female (N= 105) and 45.9% were male (N= 89). Most of the participants came from the UK (N= 57) and the USA (N= 67). For a complete list of countries of permanent residence (see section 32 for full details). There was no missing data.

14.2.3. Measures

- Zimbardo Time Perspective Inventory (ZTPI)
- Hypomanic Personality Scale (HPS-20)

+Participant Information Sheet +Informed Consent Sheet

+Unstandardized questions, i.e. DoB, Sex, Country of permanent residence

14.3. Study 3

14.3.1. Primary Purpose

- Establish test-retest reliability of the predictive utility of time perspective in a larger sample of adults with bipolar disorder
- To build a model around time perspective that more accurately predicts bipolar mood states. Study 3 built on the pilot study by keeping the successful predictors of study 1 in the analysis and adding variables believed to moderate the relationship between mood and time perspective.

14.3.2. Sample 3 (N=514)

984 participants with a self-reported diagnosis of bipolar disorder started the online-survey between July 2012 and October 2013.
According to the inclusion criteria, participants had to confirm to

- have a formal diagnosis of a type of bipolar disorder
- be between 18 and 65 years old
- be fluent in English
- have no learning disability

After these criteria were applied, 514 cases remained in the sample. 82.3 % were female (N=424) and 17.1% were male (N=88). 168 participants reported to have a diagnosis of bipolar I, and 170 participants reported a bipolar II diagnosis. 6 specified their diagnosis was 'bipolar disorder not otherwise specified'. 171 participants gave incomplete answers or were unsure of their diagnosis. Most participants stated they were from the UK or the USA. There were no missing data.

13.3.3. Measures

- Zimbardo Time Perspective Inventory (ZTPI)
- Internal State Scale (ISS)

- Brief Self-Control Scale
- Attentional Impulsiveness of the BIS-11
- Interpersonal Evaluation List (ISEL)

+Participant Information Sheet +Informed Consent Sheet

+Unstandardized questions: DoB, Sex, Relationship Status, Type of Bipolar Diagnosis and highest level of education completed

VI. Statistical Analysis and Results

The following sections will present the results of the statistical analysis for each of the ten research questions.

15. Research Question 1:

Are the five time perspective means significantly different between symptomatic bipolar adults (sample 1+ 3) and healthy adults (sample 2)?

15.1. Hypotheses

I. All five time perspectives will be significantly different between sample 1 + 2

II. All five time perspectives will be significantly different between sample 2 + 3

III. All five time perspectives will not be significantly different between sample 1 + 3

15.2. Variables

- 1 categorical independent variable with three levels, i.e. Study 1 (bipolar sample 1), Study 2 (healthy individuals), Study 3 (bipolar sample 2).
- 5 continuous dependent variables, i.e. past-positive TP, Past-Negative TP, Present-Fatalistic TP, Present-Hedonistic TP, Future TP.

15.3. Choice of Statistical Test

A multivariate analysis of variance was conducted to establish whether differences in time perspective means exist between the three samples. However, the sample sizes in this study

were grossly unequal, which MANOVA is sensitive to. As a solution, the samples were balanced via random case selection in IBM SPSS 22 (2013).

15.4. Sample used

The initial sample consisted of the 121 symptomatic cases of study 1 (N=140), i.e. all cases except for euthymic individuals, as well as all 194 individuals without a mental health diagnosis of study 2 and 445 individuals from study 3 that were currently experiencing an acute mood episode. However, due to MANOVA being sensitive to grossly unbalanced samples, the number of cases from study 2 and 3 were reduced to match the number of participants in study 1, i.e. 121 cases per study. The 142 cases from study 2 and 3 were selected via random case selection in SPSS 22 (2013).

The final sample included 121 healthy adults, 121 randomly selected symptomatic bipolar individuals from study 2 and 121 randomly selected symptomatic bipolar individuals from study 3, N=363. From this sample, 14 univariate outliers were removed. The final sample was hence N=349.

15.5. Assumption Testing

Normality

Univariate and multivariate normality was checked using Q-Q plots, histograms. The histogram for the past-negative time perspective of the 3rd study appeared to be slightly skewed. The Q-Q plot for this particular subscale revealed that only small percentage of the scores were off the expected normal scores, albeit not far enough off to constitute a serious violation of the normality assumption. The large sample size in this analysis should also protect against such minor deviations from normality (Tabachnick & Fidell, 2007). The Kolmogorov-Smirnov Test further indicated that the alpha-level for the following subgroups had to be adjusted: Past-Negative TP (symptomatic adults in Study 1), Present-Hedonistic time perspective (Symptomatic adults in Study1), Past-Positive TP (Symptomatic adults in Study 1 and adults with no mental health diagnoses in study 2).

Linearity

Scatterplots were examined and no serious violations to this assumption were detected

Multicollinearity and singularity

The correlations between the dependent variables in this sample were satisfactory overall.

Homogeneity of variance

Box's M test was significant, p=0.002. However, with large samples such as the one in this study, a significant result is often the case as this test is extremely sensitive. MANOVA is safe to use if the cell sizes are balanced, which is the case here. Tabachnick and Fidell (2007) suggest ignoring significant results in such cases unless p is below 0.001 and due to multivariate outliers or unequal sample sizes. Both issues have been taken care of by balancing sample sizes and excluding outliers for this analysis. It is recommended to use Pillai's Trace as a test statistic in MANOVA if Box's M is significant (Tabachnik & Fidell, 2007).

15.6. Results

In order to establish whether time perspectives are different in symptomatic bipolar adults and healthy adults, a one-way between participants multivariate analysis of variance was conducted. The three samples compared contained all 121 symptomatic cases of sample 1, as well as 121 randomly selected symptomatic cases of study 3 and 121 randomly selected healthy adults of study 2. An inspection of the mean scores between the three samples reveals that healthy participants scored lower than symptomatic bipolar participants in all time perspectives, apart from the future TP and past-positive TP- scale (table 6).

Table 6: Time Perspective Means in studies 1-3

Table 6				
	Study #	Mean	Std. Deviation	N
Past-Negative TP	1	3.9675	0.57413	118
	2	3.2076	0.73916	118
	3	4.1549	0.55678	113
	Total	3.7712	0.75023	349
Present-Hedonistic TP	1	3.4705	0.62765	118
	2	3.2243	0.56257	118
	3	3.4655	0.57934	113
	Total	3.3856	0.60017	349
Future TP	1	3.1109	0.66453	118
	2	3.4720	0.57992	118
	3	2.9612	0.50683	113

	Total	3.1845	0.62471	349
Past-Positive TP	1 2 3 Total	2.7564 3.2166 2.6529 2.8785	0.66911 0.77769 0.71457 0.76061	118 118 113 349
Present-fatalistic TP	1 2 3 Total	3.0884 2.6064 3.3579 3.0127	0.66386 0.66661 0.57539 0.70762	118 118 113 349
N=349				

A comparison of the standard deviation scores also showed interesting patterns: Especially in the past-positive and past-negative TP subscale, but also to a lesser extent in the present-fatalistic subscale, the scores in the normal sample were more varied for participants without mental health diagnosis than in symptomatic bipolar adults. The present-hedonistic scores of normal participants on the other hand were associated with the lowest variability around the mean. Participants without mental health diagnoses scored lowest on hedonistic present TP and there was little variation around their low scores (table 6). The overall model with all five dependent time perspective variables was significant, $F\ (10, 686) = 16.05$, $p<0.001$, Pillai's Trace= 0.379, partial eta squared= 0.19. Thus, the time perspectives in combination are significantly different between healthy adults and symptomatic bipolar participants (for MANOVA output, see table 7 + 8).

Table 7: Research question 1: MANOVA output: **Multivariate Tests** comparing all five TP-means of symptomatic bipolar adults (sample 1+3) to those of healthy adults (sample 2)

Table 7							
		Value	F	Df	Error df	Sig	Partial Eta Squared
Current Mood	Pillai's Trace	0.379	16.049	10.000	686.000	<0.001	0.190
	Wilk's Lambda	0.626	18.049	10.000	684.000	<0.001	0.209
	Hotelling's Trace	0.589	20.086	10.000	682.000	<0.001	0.228
	Roy's Largest Root	0.575	39.414	5.000	343.000	<0.001	0.365

When considered separately, all five time perspectives were significant, using a Bonferroni adjusted alpha level of 0.01:

- Past-Negative TP, F (2,346) = 73.96, p<0.001, partial eta squared=0.3
- Present-Hedonistic TP, F (2, 346) = 6.65, p=0.001, partial eta squared=0.04
- Future TP, F (2,346) = 23.14, p<0.001, partial eta squared=0.12
- Past-Positive TP, F (2,346) = 20.14, p<0.001, partial eta squared=0.104
- Present-Fatalistic TP, F (2,346) = 41.36, p<0.001, partial eta squared=0.193

There are thus significant TP differences between the symptomatic bipolar participants and adults without mental health diagnoses, which allowed for further inspection of the results to answer the research question.

Table 8: Research question 1: **MANOVA: Test of Between-Participants Effects**: On which time perspectives do symptomatic bipolar adults (sample 1 + 3) and adults without mental health diagnosis differ?

		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Current Mood	Past Negative TP	9.440	2	9.440	73.959	<0.001	0.301
	Present Hedonistic TP	17.897	2	17.897	6.648	<0.001	0.041
	Future TP	150.898	2	150.898	23.142	<0.001	0.122
	Past-Positive TP	200.847	2	200.847	20.144	<0.001	0.104
	Present-Fatalistic TP	283.456	2	283.456	41.361	<0.001	0.193

Table 9: Research Question 1: MANOVA output: **Levene's Test of Error Variances** comparing TP means of symptomatic bipolar adults (sample 1+3) to adults without mental health diagnoses (sample 2)

Table 9				
	F	Df1	Df2	Sig.

Past-Negative TP	6.315	2	346	0.002
Present-Hedonistic TP	1.869	2	346	0.156
Future TP	3.363	2	346	0.036
Past Positive TP	0.785	2	346	0.457
Present Fatalistic TP	1.494	2	346	0.226

The expected group differences between groups should be significant between samples 1 and 2 as well as 2 and 3, but non-significant between samples 1 and 3 (both symptomatic bipolar adults). Tucky Post-Hoc multiple comparisons revealed that this was indeed the case in all time perspectives, apart from the present-fatalistic TP, where the group difference between, group 1 (symptomatic bipolar) and group 3 (symptomatic bipolar adults) was also significant when it was expected not to be. Consequently, hypotheses I. and II. were accepted, i.e. all five time perspectives differed between symptomatic adults in samples 1 and healthy adults in 2, as well as in healthy adults of sample 2 and the symptomatic adults of sample 3. Hypothesis II. Was thus rejected as the present-fatalistic TP was different in all three groups. Hypothesis III. was rejected. However, only one of the time perspectives, PFTP, was different in both bipolar samples. The other four TP's were similar in both bipolar samples, as was expected.

16. Research Question 2:

Are the time perspective means of the euthymic participants of both bipolar samples (study 1 and 3) significantly different from the TP means of the healthy sample (study 2)?

16.1. Hypothesis

IV. Euthymic adults and healthy adults will not differ in terms of their five time perspective means.

16.2. Variables

- Five continuous dependent variables in this analysis that are the five time perspectives: Past-positive, Past-negative, future, present-fatalistic and present-hedonistic TP.
- One categorical independent variable with three levels, i.e. study 1, study 2 (healthy participants) and study 3.

16.3. Sample used

This sample consisted of all 19 euthymic cases of study 1, as well as 20 out of the 69 euthymic participants of study 3 that were randomly selected through random case selection in SPSS 22. The sample also included 20 randomly selected cases out of all 195 healthy participants of study 2. The sample sizes were reduced in order to balance sample sizes to conduct a MANOVA considering that the cell sizes would otherwise have been very unequal (i.e. 19 [study 1] vs. 195 [study 2] vs. 69 [study3]). This yielded a total sample size of N=59.

16.4. Choice of Statistics Test & Theoretical Considerations

A one-way between participants multivariate analysis of variance (MANOVA) was conducted to see if euthymic adults scored similarly to healthy adults in all time perspective subscales.

16.5. Assumption testing

Sample Size

The minimum number of cases per cell was 6 for this sample, which was exceeded in this analysis. Roughly 20 cases per cell, as is the case, should ensure a robust analysis.

Outliers

Inspection of boxplots revealed one univariate outlier (Participant 5 in study 3, in the present-fatalistic subscale). Because there was only one outlier in one of the studies, and on only one of the five subscales, it was decided to leave this case in the analysis. Mahalanobis Distance was calculated to check for multivariate outliers. The maximum Mahalanobis distance value of 20.379 did not exceed the critical value of 20.52 that is suggested for five dependent variables (in Tabachnick & Fidell, 2007). Thus, it can be assumed that there are no multivariate outliers.

Normality

Q-Q plots and histograms were inspected. No serious violations of the normality assumption were found in this sample. A Kolmogorov-Smirnov Test further revealed no significant results, indicating normality. The Mahalanobis distance value (see above) also gives confidence in multivariate normality.

Multicolliearity

The correlations between the dependent variables were not extreme and hence the assumption of multicollinearity was not violated.

Homogeneity of variance

Box's Test of Equality of Covariance was non-significant, $p=0.41$, and hence the assumption of homogeneity of variance was not violated.

16.6. Results

An inspection of the time perspective mean scores of the two euthymic samples of study 1 and 3 and the healthy control sample of study 2 revealed that the healthy controls scored lowest on the past-negative and present-fatalistic TP and highest on the Future TP.

A one-way between-groups multivariate analysis of variance was performed to investigate time perspective differences between the two groups of bipolar participants in remission compared to individuals with no mental health diagnoses. There were five dependent variables, i.e. the five time perspectives measured in the ZTPI (Zimbardo & Boyd, 1999). The independent variable had three levels, i.e. study 1, study 2 and study 3. These samples were balanced based on random case selection performed in IBM SPSS 22 (2013) so that the cell sizes were roughly equal. No serious violations of the MANOVA assumptions were noted. The analysis revealed that the model with all five time perspectives was a good fit to the data: Overall, there is a difference between the model containing all time perspectives means across groups, $F (10, 104) = 2.619$, $p=0.01$, Wilk's $\Lambda = 0.64$, partial $\eta^2= 0.2$ (table 10)

Table 10: Research Question 2: MANOVA output: **Multivariate Tests** comparing all five time perspective means of euthymic bipolar adults (sample 1 +3) to adults without mental health diagnoses (sample 2)

Table 10		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Current Mood	Pillai's Trace	0.375	2.449	10.000	106.000	0.011	0.188
	Wilk's Lambda	0.638	2.619	10.000	104.000	0.007	0.201
	Hotelling's Trace	0.546	2.783	10.000	102.000	0.004	0.214
	Roy's Largest Root	0.504	5.337	5.000	53.000	<0.001	0.335

Inspecting the results of the dependent variables separately, the only variables that emerged to be statistically significant, using a Bonferroni adjusted alpha level of 0.01, was past-negative TP, $F (2, 56) = 6.6$, $p=0.003$, partial $\eta^2= 0.191$. Future TP also would have reached significance under traditional alpha levels, $F (2, 56) = 3.813$, $p=0.028$, partial $\eta^2=0.12$ (Table 11).

Table 11: Research question 2: MANOVA output: **Test of between-participants-effects**: Are there significant differences between euthymic bipolar adults and adults without a mental health diagnosis for each of the TP's?

Table 11		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Current Mood	Past Negative TP	6.540	2	3.270	6.597	0.003	0.191
	Present Hedonistic TP	0.206	2	0.103	0.345	0.710	0.012
	Future TP	2.672	2	1.336	3.813	0.028	0.120
	Past-Positive TP	2.127	2	1.063	1.693	0.193	0.057
	Present-Fatalistic TP	2.153	2	1.077	1.840	0.168	0.062

Post-Hoc multiple comparisons were particularly valuable for this analysis to establish between which groups the differences between time perspectives were. The multiple comparisons (table 12, see next page) revealed that the only significant differences within the past-negative TP were between study 2 and 3, i.e. the adults without mental health diagnoses versus euthymic bipolar adults.

Table 12: Research Question 2: MANOVA output: Multiple Comparisons Table: Between which samples (study 1, 2 or 3) do the significant differences in TP means lie?

Table 12							
Dependent Variable	Study	Study	Mean Difference	Std. Error	Sig	Lower Bound	Upper Bound
Past-Negative TP	Study 1	Study2	0.2959	0.22554	0.395	-0.2471	0.8389
		Study3	-0.5041	0.22554	0.074	-1.0471	0.0389

	Study 2	Study 1	-0.2959	0.22554	0.395	-0.8389	0.2471
		Study 3	-0.8000	0.22263	0.002	-1.3360	-0.2640

	Study 3	Study 1	0.5041	0.22554	0.074	-0.0389	1.0471
		Study 2	0.8000	0.22263	0.002	0.2640	1.3360
Present-Hedonistic TP	Study 1	Study 2	-0.1039	0.17512	0.824	-0.5255	0.3177
		Study 3	-0.1406	0.17512	0.703	-0.5622	0.2810

	Study 2	Study 1	0.1039	0.17512	0.824	-0.3177	0.5255
		Study 3	-0.0367	0.17286	0.976	-0.4528	0.3795

	Study 3	Study 1	0.1406	0.17512	0.703	-0.2810	0.5622
		Study 2	0.0367	0.17286	0.976	-0.3795	0.4528
Future TP	Study1	Study 2	-0.2925	0.18962	0.279	-0.7490	0.1640
		Study 3	0.2229	0.18962	0.473	-0.2337	0.6794

	Study 2	Study 1	0.2925	0.18962	0.279	-0.1640	0.7490
		Study 3	0.5154	0.18717	0.021	0.0648	0.9660

	Study 3	Study 1	-0.2229	0.18962	0.473	-0.6794	0.2337
		Study 2	-0.5154	0.18717	0.021	-0.9660	-0.0648
Past-Positive TP	Study 1	Study 2	-0.2370	0.25392	0.622	-0.8484	0.3743
		Study 3	0.2241	0.25392	0.654	-0.3873	0.8354

	Study 2	Study 1	0.2370	0.25392	0.622	-0.3743	0.8484
		Study 3	0.4611	0.25065	0.166	-0.1423	1.0646

	Study 3	Study 1	-0.2241	0.25392	0.654	-0.8354	0.3873
		Study 2	-0.4611	0.25065	0.166	-1.0646	0.1423
Present-Fatalistic TP	Study 1	Study 2	-0.0673	0.24505	0.959	-0.6572	0.5227
		Study 3	-0.4339	0.24505	0.189	-1.0239	0.1561

		Study 1	0.0673	0.24505	0.959	-0.5227	0.6572
		Study 3					

		---------	-0.3667	0.24189	0.291	-0.9490	0.2157
		Study 1					
		Study 2	0.4339	0.24505	0.189	-0.1561	1.0239
			0.3667	0.24189	0.291	-0.2157	0.9490

In summary, no significant differences between euthymic adults and healthy adults were found, with the exception of only one TP (PN). Consequently, hypothesis IV. was rejected. However, the effect seen in PNTP was not consistent, i.e. it was measured only between *one* of the two euthymic bipolar samples and the healthy adults, but not in the other euthymic bipolar sample. Thus, overall these results indicate that there are no significant differences in TP-means in healthy and euthymic bipolar participants.

17. Research questions 3 and 4:

3.) Are the TP means of symptomatic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?

And

4.) Are the TP means of euthymic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?

17.1. Hypotheses

IV. The time perspective means of bipolar adults in a manic, depressed or mixed mood phase differ significantly from ideal time perspective values (Zimbardo & Boyd, 2012; see figure 1).

V. The time perspective means of bipolar adults in a euthymic mood state do not differ significantly from the ideal time perspective values.

17.2. Variables

- The means of the five time perspectives are compared to an ideal value: The respective ideal TP subscale values as published on Zimbardo's time perspective website (Zimbardo & Boyd, 2012).

17.3. Sample

To answer research question 3, only those cases of sample 1 (N=140) that were identified to be experiencing *either* a manic, depressive or mixed mood episode according to the ISS (Bauer, 1991) were included in the first one sample t-test analysis. This sub-sample included 113 adults of study 1: 44 (hypo-) manic individuals, 33 depressed and 44 individuals experiencing mixed mood. The remaining euthymic cases of study 1 (N=19) only were used in a separate one samples t-test analysis in order to answer research question 4.

17.4. Choice of statistics test

A two-tailed one-sample t-test was conducted for each of the five time perspectives separately to establish whether the means for each TP in this symptomatic bipolar sample would differ significantly from the five values published as 'ideal values' by Zimbardo & Boyd (2012), e.g. the mean future TP-value for all symptomatic adults of study 1together was compared to the corresponding ideal future TP-value published online. For research question 4, the five TP means were calculated for the euthymic participants of study 1 and each of these were compared to their corresponding 'ideal TP value' using a two tailed one-sample t-test.

17.5. Assumption Testing

T-tests assume normality and a sample without outliers. However, Moore & McCabe (2006; in Tabachnick and Fidell, 2007) argue that a sample size larger than 40 should guarantee that the one-sample t-test can be used safely without regard to skewedness or outliers. This rationale is based on the central limit theorem. Inspection of histograms and Q-Q plots confirmed Moore & McCabe's (2006) rule and showed a normal distribution per ZTPI-subscale in both sub-samples. There were also no extreme outliers identified in boxplots and consequently no cases were removed. T-tests also assume that the dependent variable is measured at interval-ratio level, which is the case here. The data should also be independent, i.e. have no relationships between the observations. Again, this is given in this sample.

17.6. Results

17.6.1. Results of research question 3

The five ideal time perspective values that have been published on Zimbardo & Boyd's (2012) website were compared to the corresponding time perspective mean of all symptomatic adults of study 1. More specifically, all symptomatic adults of sample 1 were pooled together and their mean score for each of the five TP's was calculated. Each of these five values were then compared to the corresponding ideal time perspective values published online (see also figure 1). Five two-tailed one-sample t-test were thus carried out. The

euthymic adults, or the healthy adults of sample 2, were not used for the purpose of this analysis. Descriptive statistics analysis revealed the means for each of the five time perspective subscale in the subsample of symptomatic cases. The means for the subscales were as follows (the ideal TP scores are in brackets):

- Past-Negative Time Perspective: M=3.96, SD= 0.60 (*2.1*)
- Present-hedonistic time perspective: M= 3.46, SD= 0.632 (*4.33*)
- Future time perspective: M= 3.12, SD= 0.668 (*3.69*)
- Past-Positive time perspective: M=2.76, SD= 0.666 (*3.67*)
- Present-Fatalistic time perspective: M=3.09, SD= 0.695 (*1.67*)

Five one-sample t-test was performed to test the hypothesis that the mean TP-subscale scores in this symptomatic bipolar sample were significantly different from the ideal TP values that are believed to contribute to a balanced time perspective and well-being. A Bonferoni-adjusted alpha level of 0.01 was used to compensate for the fact that five analyses were conducted with the same data set. Hypothesis V. was therefore accepted, i.e. all time perspectives in the symptomatic bipolar sample were significantly different from the ideal TP scores:

- The observed mean past-negative time perspective score was significantly different from the ideal score of 2.1, $t(120) = 34.158$, $p < 0.001$.
- The mean present-hedonistic time perspective score was significantly different from the ideal value of 4.33, $t(120) = (-15.173)$, $p<0.001$.
- The mean future time perspective score was significantly differed from the ideal score of 3.69, $t(120) = (-9.407)$, $p<0.001$.
- The mean past-positive TP score significantly differed from the ideal value of 3.67, $t(120) = (-15.040)$, $p<0.001$.
- The mean present-fatalistic time perspective score significantly differed from the ideal value of 1.67, $p<0.001$.

The results are summed up in table 13. Based on them, hypothesis V. was accepted, i.e. all mean time perspective scores in the symptomatic bipolar sub-sample ere significantly different from the ideal TP scores that are believed to support healthy functioning (Zimbardo & Boyd, 2012).

Table 13: Research Question 3: **One samples t-test**: Time Perspective Means of symptomatic bipolar adults of sample 1 compared to the ideal time perspective values published on Zimbardo (2012)

Table 13						
					95% Confidence Interval of the difference	
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Past-Negative TP	34.158	120	<0.001	1.86251	1.7546	1.9705
Present-Hedonistic TP	-15.173	120	<0.001	-0.87228	-0.9861	-0.7584
Future TP	-9.407	120	<0.001	-0.57164	-0.6920	-0.4513
Past-Positive TP	-15.040	120	<0.001	-0.91035	-1.0302	-0.7905
Present-Fatalistic TP	22.457	120	<0.001	1.41802	1.2930	
N=121						

17.6.2. Results of Research question 4

The same procedure was repeated separately with the euthymic group of the pilot study only (N=19).

The mean scores on the time perspective subscales were as follows; ideal TP scores are in brackets:

- Past-Negative TP: M=3.47, SD=0.772 (*2.1)*
- Present Hedonistic TP: M=3.24, SD=0.593 (*4.33*)
- Future TP: M=3.38, SD=0.709 (*3.69*)
- Past-Positive TP: M=3.08, SD=0.802 (*3.67*)
- Present-Fatalistic TP: M=2.65, SD=0.824 (*1.67)*

Results showed that there were also statistically significant differences between the observed time perspective means in the euthymic sub-sample and the ideal TP values, apart from the future time perspective that appeared to be not significantly different from the ideal future TP value, t (18) = (-1.90), p= 0.073. Hence, the future TP score in euthymic individuals of study

1 is close to what is believed to be ideal for this particular TP. All other subscales are significantly different from the ideal values (see table 14). Hypothesis VI. was rejected.

Table 14: Research Question 4: **One samples t-test**: Time Perspective Means of euthymic bipolar adults of sample 1 compared to the ideal time perspective values published on Zimbardo (2012)

Table 14					95% Interval of	Confidence the difference
	T	Df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Past-Negative TP	7.711	18	<0.001	1.36593	0.9937	1.7381
Present-Hedonistic TP	-8.011	18	<0.001	-1.09061	-1.3766	-0.8046
Future TP	-1.901	18	0.073	-0.30943	-0.6514	0.0325
Past-Positive TP	-3.210	18	0.005	-0.59036	-0.9767	-0.2040
Present-Fatalistic TP	5.211	18	<0.001	0.98497	0.5878	1.3821

18. Research Question 5:

Does time perspective (TP) underpin manic, depressed, mixed mood and euthymia in bipolar disorder differentially? Is TP able to differentiate between these episodes?

18.1. Hypothesis

VI. The means on the set of the five time perspectives significantly differ across current self-reported mood in bipolar disorder.

18.2. Variables

- One categorical Independent variable (fixed factor):
  'Current Mood State' with four levels (1=manic, 2= depressed, 3= mixed mood, 4= euthymia; the latter being the reference category).

- Five continuous dependent variables:
  The five total time perspectives (past-positive, past-negative, future, present-hedonistic, present-fatalistic time perspective).

18.3. Sample

The sample used was that of study 1 with all 140 adults that reported to have a formal diagnosis of bipolar disorder.

18.4. Choice of statistical test & Theoretical Considerations

A one-way between-groups multivariate analysis of variance was performed to investigate whether or not time perspective differs significantly between mood states in bipolar disorder.

18.5. Assumption Testing

Sample size

The minimum number of cases per cell needs is 6; one case more than there are dependent variables. This assumption was met: There were 44 self-reported (hypo-) manic, 33 depressed, 44 mixed and 19 euthymic cases. With 20 cases or more per cell, Tabachnick & Fidell (2007, 39) assume the model to be robust even when there are some violations to assumptions such as normality.

Normality

The significance tests of MANOVA are based on multivariate normal distribution, though the test is overall reasonably robust to some violations of normality. Histograms suggest reasonable univariate normality in the four mood groups, as did an inspection of Q-Q plots. These methods were followed up by a Kolmogorov-Smirnov Test. With three exceptions, the results were all non-significant, indicating normal distributions. The exceptions were Present-Hedonistic TP in the manic group and Past-Negative TP in both the mixed mood and euthymic group. For these significant variables, a more conservative alpha level must be set in the data analysis. MANOVA is, however, relatively robust to moderate violations of the normality assumption, especially where cases per cell are 20 or more. Multivariate normality was assessed using Mahalanobis distance. The Mahalanobis Distances maximum value was 17.320, SD=3.13. Since the critical value of 20.52 for five dependent variables that Tabachnick & Fidell (2007) suggest was not exceeded, it can be assumed that there are no multivariate outliers.

Outliers

Boxplots were inspected to detect univariate outliers. No extreme outliers were detected.

Linearity

Scatterplots between the dependent variables were assessed; no serious violations of this assumption were detected.

Multicollinearity and singularity

MANOVA works best when the dependent variables are only moderately correlated. Half of the dependent variables are indeed moderately related, while the other half is weakly related (Cohen, 1988). It has to be considered here that time perspectives are conceptually related,

though meant to be relatively independent from each other. They are designed to be studied together as one does never exist without the other and both may influence each other (Zimbardo, Keough & Boyd, 1997).

Homogeneity of variance

The Box's Test of Equality of Covariance Matrices was non-significant, p=0.110, and hence this assumption was not violated and the MANOVA analysis was carried out.

18.6. Results

A one-way between-groups multivariate analysis of variance was performed to investigate whether or not time perspective differs significantly between mood states in bipolar disorder. Five dependent variables were used: Past-negative time perspective, post-positive TP, future TP, present-hedonistic and present-fatalistic TP. The independent variable was current mood state within all bipolar adults of sample 1, with four categorical levels: mania, depressed, mixed mood, and euthymic. Preliminary assumption testing was conducted to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no serious violations noted. There was a statistically significant difference between current moods on the combined dependent variables: F (15,402) =2.40, p=0.002, Pillai's Trace= 0.246, η^2 =0.082 (see table 15).

Table 15: Research Question 5: **MANOVA: Multivariate Tests** comparing all five TP means between all participants of study 1 currently experiencing mania, depression, mixed mood or euthymia

Table 15							
		Value	F	Hypothesis df	Error df	Sig	Partial Eta Squared
Current Mood	Pillai's Trace	0.246	2.396	15.000	402.000	0.002	0.082
	Wilk's Lambda	0.769	2.430	15.000	364.795	0.002	0.084
	Hotelling's Trace	0.281	2.451	15.000	392.000	0.002	0.086
	Roy's Largest Root	0.180	4.830	5.000	134.000	<0.001	0.153

When the results for the dependent variables were considered separately, the only differences to reach statistical significance were Past-negative TP, F (3,136) = 6.448, p<0.001, η^2= 0.13, and Present Hedonistic TP, F (3,136) = 3.004, p=0.033, η^2= 0.062 (see table 16 & 17). Thus, hypothesis VII. was rejected; i.e. not all time perspectives underpin mood states in bipolar disorder differentially.

Table 16: Research Question 5: **MANOVA: Levene's Test of Equality of Error Variances** to establish if TP means are significantly different in all adults of study 1 experiencing depressed, manic, mixed mood or euthymia

Table 16				
	F	Df1	Df2	Sig.
Present Hedonistic TP	0.956	3	136	0.416
Past- negative TP	02.884	3	136	0.038
Future TP	1.182	3	136	0.319
Past Positive TP	2.011	3	136	0.115
Present fatalistic TP	0.804	3	136	0.494

Table 17: Research Question 5: **MANOVA: Test of Between-Participants-effects** to establish if TP means are significantly different in all adults of study 1 experiencing depressed, manic, mixed mood or euthymia

Table 17							
		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Current Mood	Past Negative TP	7.216	3	2.405	6.448	<0.001	0.125
	Present Hedonistic TP	3.425	3	1.142	3.004	0.033	0.062
	Future TP	2.659	3	0.886	1.972	0.121	0.042
	Past-Positive TP	1.749	3	0.583	1.225	0.303	0.026
	Present-Fatalistic TP	3.897	3	1.299	2.549	0.058	0.053

An inspection of the mean scores (table 18) indicated that participants in mixed mood states reported the highest past-negative time perspective scores (M=4.17, SD=0.09) and euthymic participants reported the lowest past-negative time perspective scores (M=3.47, SD=0.14).

Table 18: Research Question 5: **MANOVA: Estimated Marginal Means** for all participants of study 1, classed by time perspective

Table 18					
				95% Confidence Interval	
		Mean	Std. Error	Lower Bound	Upper Bound
Past-Negative TP	Manic	3.876	0.092	3.694	4.058
	Depressed	3.799	0.106	3.588	4.008
	Mixed	4.173	0.092	3.991	4.355
	Euthymic	3.466	0.140	3.189	3.743
Present-Hedonistic TP	Manic	3.628	0.093	3.445	3.812
	Depressed	3.256	0.107	3.044	3.468
	Mixed	3.438	0.093	3.255	3.622
	Euthymic	3.239	0.141	2.960	3.519

Additionally, the highest present-hedonistic scores were reported by manic participants (M=3.628, SD=0.09) within sample 1, while euthymic individuals reported the lowest present-fatalistic scores (M=3.24, SD=0.14). In summary, this analysis supported hypothesis I and gave reason for further analysis in form of research question 6.

19. Research Questions 6 + 7:

Can time perspective predict manic, depressed, mixed and euthymic mood states in bipolar disorder?

And

Can time perspective predict mood states in bipolar over and above other already established predictors of acute mood states in the disorder (BIS/BAS sensitivity and impulsiveness)?

19. 1. Hypotheses

VIII. Time perspective can significantly predict manic, depressive, mixed and euthymic mood states in adults with bipolar disorder.

IX. Present-Hedonistic TP significantly predicts mania in bipolar disorder.

X. Time perspective can significantly predict acute mood states in bipolar disorder over and above BIS/BAS activation levels.

XI. Time perspective can significantly predict mood states in bipolar disorder over and above motor impulsiveness, attentional impulsiveness and non-planning impulsiveness.

19.2. Variables

- 12 independent variables:

  five time perspectives, as well as the four BIS/BAS subscales and three BIS-11 (impulsiveness) subscales and total score.

- One categorical dependent variable:

  Four mood states as identified by the ISS: mania, depression, mixed mood and euthymia. The last category (i.e. euthymia) was used as the reference category. This was based on theoretical grounds given that the other three categories (manic, mixed mood, depressed) are the acute affective states, as opposed to frequencies.

19.3. Sample

The sample used was that of study 1, i.e. all 140 participants.

19.4. Choice of statistical test and theoretical considerations

After establishing that time perspective does differ in the four mood states in bipolar disorder, the second question arises whether or not time perspective is also able to statistically predict bipolar mood states. A multinomial logistic regression (MLR) was carried out on the same data set as the MANOVA in research question 1. In order to assess time perspectives predictive utility, two already established predictors of mood episodes in bipolar disorder were also assessed in this regression model: BIS/BAS sensitivity and impulsiveness. These were analysed for comparative purposes. This study was explorative and interested in establishing the main effects of each variable in the model and their respective predictive power. A main effects model was hence fitted to the data.

19.5. Assumption testing

Multinomial logistic regression does not assume normality, linearity or homoscedasticity. It does, however, assume that the levels of the dependent variable are independent, which is the case in this dataset where the dependent variable is current mood with four levels (manic, depressed, mixed mood, euthymic) and these are independent categories with no choice involved. The assumption of independence of irrelevant alternatives says that the membership to one group (DV) should not change when irrelevant alternatives are removed, i.e. a participant should remain in their current mood state group even when another is removed. This assumption is met based on the fact that group membership is not a choice but groups are assigned based on scores that would not change even after removal of another mood state group. Pre-analysis should also inspect outliers. No extreme outliers were found in the assumption testing of MANOVA on the same sample (for research question 1); thus 140 cases remained in the analysis.

19.6. Results

A multinominal logistic regression was conducted comparing the predictive power of all time perspective, BIS/BAS and impulsiveness subscales in terms of current self-reported mood in bipolar disorder. There were 140 cases of bipolar adults in this sample, i.e. both symptomatic cases and euthymic cases. A main effects model was fitted to the data, exploring how well each individual time perspective predicts current mood states in bipolar disorder, compared to BIS/BAS sensitivity scores and impulsiveness, without interaction effects. In fitting a main effects model, the individual contributions of each variable to predicting mood states could be assessed.

The overall model fit was significant (Chi Square=74.71, df= 36, $p< 0.001$) indicating that the independent variables, as a group, contributed significantly to predicting current self-reported mood states in bipolar disorders. A lower Akaike's Information Criterion for the final model, compared to the intercept only model, further gives confidence in the model's fit (see table 19; Tabachnick & Fidell, 2007).

Table 19: Research Questions 6 + 7: **Multinominal Logistic Regression: Model Fitting Information:** Can a model with all TP's predict group membership of participants in sample 1?

Table 19					
	Model Fitting Criteria			Likelihood Ratio Tests	
	AIC	-2 Log Likelihood	Chi Square	Df	Sig.
Intercept only	380.984	374.984			
Final	378.273	300.273	74.711	36	<0.001

The next part of the output (table 20) investigates further whether the fitted model is a good fit of the data.

Table 20: Research questions 6 + 7: Multinominal Logistic Regression: Goodness of Fit of the multinominal logistic regression model fitted to all participants of study 1

Table 20			
	Chi-Square	Df	Sig.
Pearson	403.193	381	0.208
Deviance	300.273	381	0.999

The goodness of fit table indicated whether or not the values predicted with the model differ significantly from the observed values. Non-significance of both statistics, Pearson ($\chi^2(381) = 403.19$, p=0.21) and Deviance ($\chi^2(381) = 300.27$, p=1.0), suggests that the observed values do not differ significantly from predicted values, thus the model is a good fit to the data. Nagelkerke's adjusted value of 0.44 can be used as an effect size for the model fitted. In this case, 0.44 represents a moderate effect size (table 21).

Table 21: Research Question 6+7: Multinominal Logistic Regression: Pseudo r^2 to determine whether TP can predict bipolar mood states in sample 1

Table 21	
Cox and Snell	0.414
Nagelkerke	0.444
McFadden	0.199

The Likelihood Ratio Tests (Table 22) indicates the significance of each separate predictor to the model.

Table 22: Research Question 6+7: Multinominal Logistic Regression: Likelihood Ratio Tests to determine if TP can predict bipolar mood states in sample 1

Table 22		Model Fitting Criteria			Likelihood Ratio Tests	
	AIC Reduced Model	BIC Reduced Model	-2Log Likelihood of Reduced Model	Chi-Square	Df	Sig
Intercept	380.745	486.644	308.745	8.471	3	0.037
Attentional Impulsiveness	382.981	488.880	310.981	10.708	3	0.013
Motor Impulsiveness	375.872	481.772	303.872	3.5999	3	0.308
Non-Planning Impulsiveness	375.007	480.906	303.007	2.733	3	0.435
BAS Drive	376.459	482.359	304.459	4.186	3	0.242
BAS Fun-Seeking	377.779	483.678	305.779	5.505	3	0.138
BAS Reward	375.038	480.937	303.038	2.765	3	0.429
BIS	377.278	483.177	305.278	5.005	3	0.171
Past-Negative TP	375.362	481.261	303.362	3.088	3	0.378
Present-Hedonistic TP	374.448	480.348	302.448	2.175	3	0.537
Future TP	380.859	486.758	308.859	8.586	3	0.035
Past-Positive TP	374.624	480.523	302.624	2.350	3	0.503
Present-Fatalistic TP	373.164	479.063	301.164	0.890	3	0.828

Future time perspective had a significant overall effect on current mood state prediction, χ^2 (3) =8.59, p=0.035, as did attentional impulsiveness, χ^2 (3) = 10.71, p=0.013. These can be seen as overall statistics that indicate which predictors significantly predict the outcome category, current mood. To specify what the nature of the effect is, however, the individual parameter estimates were inspected (table 23).

Table 23: Research Questions 6+7: Multinominal Logistic Regression: Parameter Estimates to compare TP with BIS/BAS sensitivity and impulsiveness in terms of their ability to predict bipolar mood states in sample 1

Table 23									

Current Mood		B	Std. Error	Wald	Df	Sig	Exp (B)	95% Confidence interval	
								Lower Bound	Upper Bound
Manic	Attentional Impulsiveness	0.202	0.095	4.4558	1	0.033	1.224	1.017	1.473
	Motor Impulsiveness	-.0.142	0.096	2.160	1	0.142	0.868	0.718	1.048
	Non-Planning Impulsiveness	0.145	0.095	2.335	1	0.126	1.156	0.960	1.393
	BAS Drive	0.142	0.161	0.770	1	0.380	1.152	0.840	1.580
	BAS Fun-Seeking	-0.011	0.201	0.003	1	0.955	0.989	0.667	1.465
	BAS reward	0.203	0.163	1.549	1	0.213	1.225	0.890	1.687
	Current Mood	**B**	**Std. Error**	**Wald**	**Df**	**Sig**	**Exp (B)**	**95% Confi-dence interval**	
	BIS	-0.068	0.090	0.570	1	0.450	0.934	0.783	1.114
	Past-Negative TP	0.355	0.579	0.375	1	0.540	1.426	0.458	4.436
	Present-Hedonistic TP	0.602	0.843	0.509	1	0.476	1.825	0.349	9.532
	Future TP	0.729	0.698	1.090	1	0.296	2.073	0.528	8.144
	Past -Positive TP	-0.754	0.534	1.996	1	0.158	0.470	0.165	1.339
	Present-Fatalistic TP	0.81	0.563	0.021	1	0.886	1.084	0.360	3.265
	Current Mood	**B**	**Std. Error**	**Wald**	**Df**	**Sig**	**Exp (B)**	**95% Confi-dence Interval**	
Depressed	Attentional Impulsiveness	0.161	0.091	3.156	1	0.076	1.175	0.984	1.403
	Motor Impulsiveness	-0.131	0.096	1.875	1	0.171	0.877	0.727	1.058
	Non-Planning Impulsiveness	0.083	0.092	0.800	1	0.371	1.086	0.906	1.302
	BAS Drive	0.143	0.160	0.804	1	0.370	1.154	0.844	1.579
	BAS Fun-Seeking	-0.213	0.194	1.204	1	0.272	0.808	0.552	1.183
	BAS reward	0.172	0.163	1.116	1	0.291	1.187	0.863	1.633
	BIS	-0.076	0.93	0.667	1	0.414	0.927	0.772	1.112
	Past-Negative TP	0.299	0.581	0.264	1	0.607	1.348	0.431	4.211

	Present-Hedonistic TP	-0.134	0.828	0.026	1	0.871	0.875	0.173	4.431
	Future TP	-0.179	0.697	0.066	11	0.798	0.836	0.213	3.280
	Past -Positive TP	-0.655	0.541	1.466	1	0.226	0.519	0.180	1.500
	Present-Fatalistic TP	0.398	0.568	0.492	1	0.483	1.489	0.489	4.529
Mixed Mood	Attentional Impulsiveness	0.308	0.101	9.236	1	0.002	1.360	1.115	1.659
		B	**Std. Error**	**Wald**	**Df**	**Sig.**	**Exp (B)**	**95% Confidence Interval**	
	Motor Impulsiveness	-0.193	0.104	3.411	1	0.065	0.825	0.672	1.012
	Non-Planning Impulsiveness	0.083	0.101	0.682	1	0.409	1.087	0.892	1.324
	BAS Drive	-0.060	0.167	0.128	1	0.720	0.942	0.679	1.307
	BAS Fun-Seeking	0.187	0.221	0.714	1	0.398	1.205	0.782	1.859
	BAS reward	0.278	0.172	2.620	1	0.106	1.321	0.943	1.851
	BIS	0.079	0.103	0.591	1	0.442	1.082	0.885	1.324
Current Mood		**B**	**Std. Error**	**Wald**	**Df**	**Sig**	**Exp (B)**	**95% Confidence interval**	
	Past-Negative TP	0.987	0.637	2.404	1	0.121	2.683	0.771	9.345
	Present-Hedonistic TP	-0.379	0.936	0.164	1	0.685	0.684	0.109	4.286
	Future TP	-0.833	0.744	1.254	1	0.263	0.435	0.101	1.868
	Past -Positive TP	-0.514	0.562	0.835	1	0.361	0.598	0.199	1.801
	Present-Fatalistic TP	0.352	0.606	0.336	1	0.562	1.421	0.433	4.665

The reference category against which the three acute mood states were compared with was euthymia. Attentional impulsiveness was the only variable that remained significant when considering which of the independent variables significantly predicted group membership. It predicted current self-reported mania, b=0.202, Wald $\chi^2(1) = 4.46$, p=0.03, as well as mixed

mood states, b=0.308, Wald χ^2 (1) = 1.24, p=0.002. One unit increase in attentional impulsiveness was associated with a 1.22 increased risk of being manic (as opposed to euthymic), as well as a 1.36 risk increase of being in the mixed mood state group. Overall, this model with twelve independent variables predicted 52.1% of classifications accurately (Table 24). Hypotheses VIII., IX. And X were accepted and XI. was rejected.

Table 24: Research Question 6 + 7: Multinominal Logistic Regression: Classifications (Cases of sample 1 classed in the correct mood state group by TP)

Table 24					
	Manic	Depressed	Mixed	Euthymic	Percent Correct
Manic	22	6	12	4	50.0%
Depressed	10	12	8	3	36.4%
Mixed	8	5	31	0	70.5%
Euthymic	4	5	2	8	42.1%
Overall Percentage	31.4%	20.0%	37.9%	10.7%	52.1%

20. Research Question 8:

Can the effect observed in research question 7 be replicated in a second, independent and bigger sample of bipolar adults (all participants of study 3)?

20.1. Hypotheses

VIII. Time perspective can statistically predict manic, depressive, mixed and euthymic mood states in bipolar disorder.

IX. Present-hedonistic time perspective will predict manic mood.

20.2. Variables

- One categorical independent variable, current mood, with four levels: Manic, depressed, mixed mood and euthymic. The latter is treated as the reference category.
- Five continuous dependent variables, i.e. the five time perspectives measured with the ZTPI

20.3. Sample

For this analysis, the complete sample of study 3 was investigated, N= 514 (88 male, 424 female). There were 149 participants that reported to be (hypo-) manic, 115 depressed, 181 in a mixed mood state and 69 euthymic cases.

20.4. Choice of Statistics Test & Theoretical Considerations

A multinominal logistic regression was conducted to test if the effects measured in study 1 would be replicated or improved in a bigger sample, the entire sample of study 3, and thus are likely to be due to a genuine effect. Because this test is designed to establish each individual

TP's predictive utility in terms of bipolar mood states, no interaction effects were investigated; a main effects model was fitted instead.

20.5. Assumptions Testing

Multinomial logistic regression does not assume normality, linearity or homoscedasticity. It does, however, assume that the levels of the dependent variable are independent, which is the case in this dataset where the dependent variable is current mood with four levels (manic, depressed, mixed mood, euthymic) and these are independent categories with no choice involved. The assumption of independence of irrelevant alternatives says that the membership to one group (DV) should not change when irrelevant alternatives are removed, i.e. a participant should remain in their current mood state group even when another is removed. This assumption is met based on the fact that group membership is not a choice but groups are assigned based on scores that would not change even after removal of another mood state group.

20.6. Results

A multinominal logistic regression was performed with the five predictor variables past-positive TP, past-negative TP, present-hedonistic TP, present-fatalistic TP and future TP. The categorical factor in this analysis was current mood state (1=manic, 2=depressed, 3=mixed mood, 4=euthymic). There were 149 manic participants, 115 depressed, 181 mixed mood state participants and 69 euthymic adults in this sample (table 25).

Table 25: Research Question 8: Multinominal Logistic Regression: Sample Characteristics of sample 1

Table 25			
		N	Marginal Percentage
Current Mood	Manic	149	29.0%
	Depressed	115	22.4%
	Mixed	181	35.2%
	Euthymic	69	13.4%
N=514			

The overall model was significant, indicating that the final model with all time perspectives was a significantly better fit to the data than the empty intercept model (table 26).

Table 26: Research Question 8: Multinominal Logistic Regression: Model Fitting Information for sample 1: Fit of the predictive regression model with all five TP's versus intercept model in study 1

Table 26						
	Model	Fitting	Criteria			
Model	AIC	BIC	-2 Log Likelihood	Chi-Square	Df	Sig.
Intercept Only	1374.33	1387.05	1368.33			
Final	1323.95	1400.31	1287.31	80.377	15	<0.001

The Akaike Information Criterion was lower for the final level than for the null model indicating a good fit of the model. The alternative Likelihood Ratio chi-square test was also significant, $\chi^2(15) = 0.38$, $p<0.001$, r 2= 0.16, indicating that the overall fitted model was significant. Hypothesis XII. was thus accepted. The goodness-of-fit table provides further evidence of a good fit of the model. Both Pearson and Deviance Chi-Square values are non-significant (table 27).

Table 27: Research Question 8: Multinominal Logistic Regression: Goodness-Of-Fit Table for the logistic regression model fitted to the sample of study 1

Table 27			
	Chi-Square	Df	Sig
Pearson	1536.690	1524	0.405
Deviance	1287.955	1524	1.000

When inspecting each predictor variable separately, present-hedonistic TP was significant at 0.001-level, $\chi^2=19.36$, $p<0.001$, as was future TP, $\chi^2=15.14$, $p=0.002$. Past-negative TP would have nearly reached statistical significance using traditional alpha-levels, $\chi^2=7.58$, $p=0.056$. Thus, the future TP and present-hedonistic TP significantly contributed to the main effect of the predicting model (table 28, see next page).

Table 28: Research Question 8: **Multinominal Logistic Regression: Likelihood Ratio Tests** of the predictive TP model fitted to the sample of study 1

Table 28						
	AIC of Reduced Model	BIC of reduced model	-2 Log Likelihood of Reduced Model	Chi-Square	Df	Sig
Intercept	1324.10	1387.74	1294.10	6.151	3	0.104
Past-Negative TP	1325.53	1389.16	1295.53	7.576	3	0.056
Present-Hedonistic TP	1337.31	1400.94	1307.31	19.358	3	<0.001
Future TP	1333.09	1396.73	1303.09	15.142	3	0.002
Past-Positive TP	1323.15	1386.79	1293.15	5.202	3	0.158
Present-Fatalistic TP	1324.08	1387.71	1294.08	6.129	3	0.106
N=514						

More specifically, the manic mood state was significantly and positively predicted by present-hedonistic TP, (B=0.71, Wald=6.7, p=0.01), future TP negatively predicted depressed mood (B=-1.28, Wald=13.15, p<001) and mixed mood states (B=-0.92, Wald=7.75, p=0.005). Hypothesis XIII was accepted. Several TP's would reach significance under traditional alpha levels, such as past-negative TP which positively predicted mixed mood states (B=0.54, Wald=4.74, p=0.03). These results are summed up in table 29.

Table 29: Research Question 8: Multinominal Logistic Regression: Parameter Estimates: Which TP predicts which mood state best?

Table 29								95% Confidence Interval	For Exp (B)
Current Mood		B	Std. Error	Wald	Df	Sig.	Exp (B)	Lower Bound	Upper Bound
Manic	Intercept	-0.317	1.614	0.039	1	0.844			
	Past-Negative TP	0.175	0.233	0.567	1	0.451	1.192	0.755	1.881
	Present-Hedonistic TP	0.714	0.275	6.744	1	0.009	2.043	1.192	3.503
	Future TP	-0.590	0.327	3.248	1	0.072	0.554	0.292	1.053
	Past-Positive TP	-0.191	0.215	0.785	1	0.376	0.826	0.542	1.260
	Present-Fatalistic TP	0.136	0.277	0.240	1	0.624	1.146	0.665	1.972
Depressed	Intercept	2.823	1.741	2.630	1	0.105			
	Past-Negative TP	0.567	0.262	4.702	1	0.030	1.763	1.056	2.944
	Present-Hedonistic TP	-0.259	0.287	0.811	1	0.368	0.772	0.440	1.356
	Future TP	-1.278	0.352	13.148	1	<0.001	0.279	0.140	0.556
	Past-Positive TP	-0.261	0.231	1.276	1	0.259	0.770	0.489	1.212
	Present-Fatalistic TP	0.317	0.300	1.114	1	0.291	1.373	0.762	2.473
Mixed	Intercept	-0.223	1.640	0.018	1	0.892	1.7433	0.856	3.244
	Past-Negative TP	0.540	0.248	4.739	1	0.029	1.716	1.055	2.791
	Present-hedonistic	0.384	0.273	1.983	1	0.159	1.468	0.860	2.506
	Future TP	-0.919	0.330	7.752	1	0.005	0.399	0.209	0.762
	Past-Positive TP	-0.458	0.218	4.403	1	0.036	0.633	0.412	0.970
N=514									

In summary, these results indicate that with every one unit change in present-hedonistic TP, participants were 0.71 times more likely to be manic as opposed to euthymic and for every one unit decrease in future TP, participants were 1.28 time more likely to be depressed and 0.92 times more likely to be experiencing mixed mood. Overall, the model explains about 16% of variance in the scores as indicated by Nagelkerke's R^2= 0.156 (table 30), and classified 41.6% of all cases correctly.

Table 30: Research Question 8: Multinominal Logistic Regression: Pseudo R-Square for sample 1

Table 30	
Cox and Snell	0.145
Nagelkerke	0.156
McFadden	0.059

21. Research Questions 9 and 10:

Can time perspective predict Hypomanic Personality Scores?

And

Which of the time perspectives predicts Hypomanic Personality Scores best?

21.1. Hypotheses

XIV. Time perspective can significantly predict hypomanic personality scores

XV. The present-hedonistic time perspective can predict most of the variance in HPS-20 scores.

21.2. Variables

- 5 continuous Independent variables: Past-positive TP, past-negative TP, present-hedonistic TP, Present-fatalistic TP, future TP
- 1 continuous dependent variable: Total HPS- scores

21.3. Sample

The complete sample of study 2 was used. After assumption testing, 9 outliers were removed, i.e. the final sample was N=185.

21.4. Choice of statistical test

This analysis aimed to investigate whether or not time perspective total subscale scores could predict hypomanic personality total scores in healthy adults, and if so, which of the time perspectives is the best predictor. A standard multiple regression is the best choice of statistical

test because it can indicate how much variance in the dependent variable can be explained by the independent variables and it also gives an indication of each predictor's contribution. Because there are no categories involved, but continuous data in all variables, a multiple regression is chosen to answer research question 9 and 10.

21.5. Assumption testing

Sample Size

Stevens (1996, 72) recommends 15 participants per independent variable for a reliable regression analysis that is generalizable to other samples. Tabachnick and Fidell (2007, 117) give a formula to calculate appropriate sample sizes for multiple regression:

N> 50 +8m

where m stands for the number of independent variables. With five independent variables, the analysis thus needs at least 90 cases. More participants are needed in case of a skewed distribution. The current sample (N=185) is thus not violating this assumption.

Multicollinearity

Multicollinearity between independent variables should be avoided in regression analysis. Correlations were calculated for the independent variables and no violation of this assumption was found. All IV's were mildly to moderately correlated. Further giving confidence in no multicolllinearity being present n this sample was the tolerance- value being over 0.1 for all independent variables and the VIF value being below 10. None of the variables correlated with each other more than 0.7 so no variables were omitted.

Outliers

Boxplots were inspected and 9 outliers were identified. These were subsequently removed. Malahanobis distance and was also used to identify multivariate outliers. Cases #21 and #131 were identified as such outliers. These were not too extreme and were thus kept in the analysis. No other unusual cases were identified using Cook's Distance.

Normality

Histograms and Q-Q plots showed that data was normally distributed.

Linearity, homoscedasticity, Independence of residuals

Residual scatterplots and the normal probability plot of the regression standardized residuals were inspected. The normality assumption was not violated according to the normal probability plot. The residual scatterplot was of a roughly centralised rectangular shape, suggesting no violation of the linearity assumption.

21.6. Results

Standard multiple regression was used to test if time perspective significantly predicted participants' Hypomanic Personality scores. The overall model fitted with all five time perspectives was significant, ($F(5.179) = 9.69$, $p<0.01$). The results suggested that two predictors explained 21.3% of the variance in the dependent variable (table 31 & 32).

Table 31: Research Question 9+ 10: Multiple Regression: ANOVA for sample 2: Can TP predict HPS?

Table 31						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	497.378	5	99.476	9.685	<0.001
	Residual	1838.438	179	10.271		
	Total	2335.816	184			

Table 32: Research question 9 +10: Multiple Regression 2: Can TP predict HPS in sample 2?

Table 32				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.461	0.213	0.191	3.20478

The biggest unique predictive contribution to the model was made by present-hedonistic time perspective ($B=0.33$, $p<0.001$), followed by past-negative time perspective ($B=0.256$, $p=0.001$). None of the other time perspectives made a significant unique contribution to the model (table 33). Both hypotheses XIII. and XVI. were thus accepted.

If present-hedonistic TP increased by one standard deviation, hypomanic personality scores would increase by 0.33 and similarly, increasing past-negative TP by one such unit would lead to a 0.26 increase in hypomanic personality. Past-negative time perspective alone predicted about 5% of the variance in hypomanic personality, while present-hedonistic time perspective predicted around 9% of the variability.

In summary, time perspective does appear to predict hypomanic personality as measured by the HPS-20, though only explains a relatively small amount of variance in HPS-scores. Considered separately, present-hedonistic TP appears to be the predictor out of the five time perspectives that contributes the most to the predictions, followed by past-negative. None of the other time perspective were able to predict the dependent variable on their own. The results are summed up in table 33 & 34.

Table 33: Research Question 9+10: Multiple Regression: Coefficient Table for sample 1: Can TP predict HPS?

Table 33												
	Unstandardized Coefficient		Standardized Coefficient			95 % Confidence Interval				Correlations		Collinearity Statistics
		Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	-5.903	3.102		-1.903	0.059	-12.023	0.218					
Past-Negative TP	1.305	0.389	0.256	3.357	0.001	0.538	2.072	0.319	0.243	0.223	0.755	1.325
Present Hedonistic TP	2.197	0.479	0.334	4.583	<0.001	1.251	3.144	0.319	0.324	0.304	0.828	1.208
Future TP	0.889	0.516	0.131	1.722	0.087	-0.130	1.907	-0.048	0.128	0.114	0.755	1.324
Past-Positive TP	-0.267	0.351	-0.056	-0.761	0.448	-0.959	0.425	-0.071	-0.057	-0.050	0.818	1.223
Present Fatalistic TP	0.629	0.450	0.110	1.400	0.163	-0.258	1.517	0.243	0.104	0.093	0.706	1.416

Table 34: Research Question 9+10: Multiple Regression: Results Summary: Can TP predict HPS in sample 1?

Table 34					
	B	Std. Error	B	Sig	R^2
Past-Negative TP	1.305	0.389	0.256	0.001	0.213
Present-hedonistic TP	2.197	0.479	0.334	<0.001	

22. Summary of Results

Table 35: Results by Research Question

Table 35 **Research Question**	**Type of analysis**	**Results**
Research Question 1: Are the five time perspective means significantly different between symptomatic bipolar adults (of sample 1+3) and healthy adults (complete sample 2)?	One-way between participants MANOVA	• Time Perspective means are significantly different between healthy adults and both bipolar samples (symptomatic cases) respectively. The two bipolar samples are not significantly different. • Compared to healthy participants, both bipolar samples scored higher on present-hedonistic TP, present-fatalistic TP and past-negative TP, but lower on past-positive and future TP.
Research question 2: Are the time perspective means of the euthymic participants of both bipolar samples (in study 1 and 3) significantly different from the TP means of the healthy sample (study 2)?	One-way between participants MANOVA	• Time Perspective means are not significantly different between both bipolar samples (euthymic cases) and healthy adults • Exception: Past-negative TP was significantly different in samples 2 + 3, i.e. healthy adults compared to one of the bipolar samples • Future TP nearly reached significance
Research question 3: Are the TP means of symptomatic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?	Two tailed one-sample t-tests	• The time perspective means on all five subscales are significantly different from ideal time perspective scores that are believed to foster healthy psychological functioning (Symptomatic bipolar adults only)
Research question 4: Are the TP means of euthymic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?	Two tailed one-samples t-test	• The time perspective means on four subscales are significantly different from ideal time perspective scores that are believed to foster healthy psychological functioning (Euthymic bipolar adults only). The only exception is future TP, which did not significantly differ from ideal TP values.

Research Question 5: Does time perspective (TP) underpin manic, depressed, mixed mood and euthymia in bipolar disorder differentially? Is TP able to differentiate between these episodes?	One-way between participants MANOVA	• Past-negative TP and Present-Hedonistic TP significantly differed across mood states in bipolar adults. • Past-negative TP was highest in mixed mood episodes. • Present-hedonistic TP was most dominant in (hypo-) manic episodes • Euthymic adults reported the lowest present-hedonistic and past-negative TP scores
Research Question 6: Can time perspective predict manic, depressed, mixed and euthymic mood states in bipolar disorder?	Multinominal Logistic Regression	• Future TP contributed significantly to an overall predictive model of moods in bipolar adults. However, it was not a significant individual predictor of moods
Research Question 7: Can time perspective predict mood states in bipolar over and above other already established predictors of acute mood states in the disorder (BIS/BAS sensitivity and impulsiveness)?	Mutlinominal Logistic Regression	• Only attentional impulsiveness was a significant individual predictor of mood states in this sample of bipolar adults (sample 1; N=140).
Research Question 8: Can the effect observed in research question 2 be replicated in a second, independent and bigger sample of bipolar adults (complete sample 3; N=540)?	Multinominal Logistic Regression	• Present-Hedonistic TP significantly predicted (hypo-) manic episodes positively • Future TP significantly predicted both depression and mixed mood states negatively • Past-Negative TP positively predicted mixed mood states at traditional 0.05 level (p=0.03) • TP predicted approx. 16% of the variance and classified 42% of cases correctly.
Research Question 9: Can time perspective predict Hypomanic Personality Scores?	Standard Multiple Regression	• The overall model with all five time perspectives predicted hypomanic personality scores significantly
Research Question 10: Which of the time perspectives predicts Hypomanic personality Scores best?	Standard Multiple Regression	• Present-hedonistic TP significantly predicted hypomanic personality scores positively • Past-negative TP significantly predicted hypomanic personality scores positively

23. Analysis of demographic data

The following section presents demographic data that were considered in this study with respect to their potential influence on the results obtained and discussed above.

23.1. Study 1: Demographic data

There was a fairly even spread across age groups in this sample, with roughly equal numbers of participants in their 30s – 60s. There were 30 participants born in the 1980s, 32 born in the 1970s, 31 in the 1960s and 26 in the 1950s. The remaining 6 participants were born in the 1990s or 1940s. The even spread gives more confidence in the assumption that the obtained results in this study have not been skewed by major differences in the age of participants. There was a major imbalance in terms of participants' gender. Only 31 male, but 109 female individuals took part. A one-way-between participants ANOVA was therefore carried out to investigate whether time perspective means significantly differed in both groups and this was not found to be the case (See table 36).

Table 36: Study 1: Demographics: One-way-Between-Participants-ANOVA

Table 36		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Past Negative TP	Between groups	0.197	1	0.197	0.470	0.494
	Within groups	57.756	138	0.419		
	Total	57.953	139			
Present Hedonistic TP	Between groups	0.302	1	0.302	0.761	0.384
	Within groups	54.809	138	0.397		
	Total	55.111	139			
Future TP	Between groups	0.003	1	0.003	0.006	0.939
	Within groups	63.799	138	0.462		
	Total	63.801	139			
Past Positive TP	Between groups	1.470	1	1.470	3.121	0.079
	Within groups	64.978	138	0.471		

	Total	66.447	139			
Present Fatalistic TP	Between groups *Within groups* Total	0.037 73.155 73.192	1 138 139	0.037 0.530	0.069	0.793

Table 37: Demographics: Study 1: Country of Permanent Residence

Table 37 **Country of Origin**	 **Number of Participants**
US	65
Australia	3
Bahrain	1
Africa	9
Canada	1
UK	54
Germany	3
Greece	1
Norway	1
Philippines	1
Tobago	1

23.2. Study 2: Demographic data

There were 89 males and 105 female participants in this study. A one-way between participants-ANOVA was conducted to investigate whether or not time perspective mean scores in a healthy sample are influenced by gender. Time perspective means did not significantly differ between male and female participants (see table 38).

Table 38: Demographics: Study 2: Gender differences in TP total scores

Table 38		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Past Negative TP	Between groups	0.018	1	0.018	0.033	0.857
	Within groups	104.506	192	0.544		
	Total	104.523.523	193			
Present Hedonistic TP	Between groups	0.001	1	0.001	0.002	0.963
	Within groups	68.195	192	0.355		
	Total	68.195	193			
Future TP	Between groups	0.220	1	0.220	0.656	0.419
	Within groups	64.295	192	0.335		
	Total	64.515	193			
Past Positive TP	Between groups	0.163	1	0.163	0.274	0.601
	Within groups	114.433	192	0.596		
	Total	114.596	193			
Present Fatalistic TP	Between groups	0.398	1	0.398	0.895	0.345
	Within groups	85.356	192	0.445		
	Total	85.754	193			

As in study 1, the vast majority of participants came from Western cultures, i.e. the United States of America and the United Kingdom (see table 39, see next page). This should be kept in mind when interpreting the results.

Table 39: Study 2: Demographics: Country of Permanent residence

Table 39 **Country of Permanent Residence**	 **Number of participants**
United States of America	66
Argentina	1
Australia	4
Belgium	1
Canada	9
Denmark	1
UK	51
Finland	1
France	4
Germany	6
India	1
Indonesia	1
Ireland	5
Italy	2
Kenya	1
Malaysia	2
Mauritius	1
Mexico	1
Norway	1
Pakistan	1
Philippines	1
Poland	1
Portugal	1
Saudi Arabia	1
South Korea	1
Switzerland	1
Thailand	2
Turkey	1

There were 21 participants in their 50s in this sample, 24 individuals in their 60, 36 participants in their 40s, 70 participants in their 30s and 44 adults in their 20s. There were also two participants in their 60s. This means that nearly half of the participants were falling within the age bracket of 30-39 years. Again, this should be considered when interpreting the results.

However, it is difficult to infer how the age demographic may have influenced TP preferences, given the fact that they are likely influenced by a variety of demographic variables that may not have been measured here.

23.3. Study 3: Demographic data

Given that the sample of study 3 was also predominantly female, a one-way between participants ANOVA was carried out to establish whether or not the mean total TP scores differed significantly between male and female participants. This was found to be not the case (see table 40)

Table 40: Demographics: Study 3: One-way between participants ANOVA

Table 40		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
Past Negative TP	Between groups	1.294	1	1.294	2.872	0.091
	Within groups	229.894	512	0.451		
	Total	231.189	513			
Present Hedonistic TP	Between groups	0.095	1	0.095	0.245	0.621
	Within groups	197.215	512	0.387		
	Total	197.309	513			
Future TP	Between groups	0.273	1	0.273	1.044	0.307
	Within groups	133.490	512	0.262		
	Total	133.763	513			
Past Positive TP	Between groups	<0.001	1	<0.001	<0.001	0.999
	Within groups	303.071	512	0.594		
	Total	303.071	513			
Present Fatalistic TP	Between groups	0.245	1	0.245	0.592	0.442
	Within groups	211.372	512	0.414		
	Total	211.617	513			

The age ranges are again relatively evenly spread. 17 participants were in their 20s, 118 adults were in their 30s, 145 participants were in their 40s, 135 individuals were in their 50's and 3 were in their 60's at the time of participation. There were 514 participants in total and thus the fact that there were only 20 participants that fell within the oldest/youngest age bracket and are the exception to the otherwise even spread of participants in all other age groups. It is thus relatively unlikely that grossly unequal age groups could have influenced TP in this sample. Again, the country of residence-entry suggests that most participants live in Western cultures, though the conclusions that can be drawn from this are very limited, given that it is not the same as the culture the individual identifies with the most. Furthermore, factors such as socio-economic status are also known to influence TP's (Sircova, 2007), yet it is unclear how both factors interact and impact on TP.

24. Supplementary Qualitative Data

After each questionnaire, participants were invited to leave any kind of comment, if they wished to do so. There were no further instructions or prompts. The following paragraphs intend to give a brief overview of comments that were relevant to establishing whether or not time perspective does have a direct relationship to bipolar mood states. The chosen comments serve illustrational purposes only, highlighting further the relationships that were uncovered in the statistical analysis of this PhD.

Unexpectedly, various respondents commented on their temporal orientations and the connections they saw between these and their own moods, as opposed to practical issues encountered during the research.

These questions were not part of the original analysis plan but they clearly complement the quantitative analysis in an important way: While the quantitative data analysis allows for investigating multiple cases at the same time to discover whether or not there is a genuinely widely experienced effect generalizable to a population, it is also heavily dependent on the sample characteristics, the psychometric properties of the chosen scales and the parameters surrounding the chosen statistical test that is being used. The comments participants made, unprompted, are valuable as they give insight into the phenomenological experience of the possible relationship between time perspective and bipolar mood states. Combined with the statistical analysis, they thus contribute to a more holistic picture of the real-life dynamics between temporal orientation and mood, as they are experienced, as opposed to measured.

Still, no generalizations can be made in terms of whether or not the reported TP's and connected experiences are typical for bipolar disorder or not given the small number of responses and brief answers.

First off, a number of participants described the manifestations of their particular, presumably dominant, time perspectives and associated biases. For example, participant #3, who reported to be depressed at the time of filling in the survey, describes his tendency to be past-oriented, though it is unclear whether this is a focus on positive or negative aspects of the past:

> *"It's hard for me to imagine that there are people who rarely dwell on their own past since that is something I find myself caught up in very easily" (#3)*

The significance of the statement lies mainly in the fact that it appears to support the very presence of temporal biases or dispositional styles that this thesis is aiming to link to extreme moods; in this case depression. A preoccupation with the past, for example in the form of rumination, has been associated with depression. Nostalgia (PPTP) on the other hand has been shown to buffer depression (Juhl et al., 2010). A past-oriented dispositional style as described by participant #3 is thus likely to be connected to depression.

Participant #11 also describes being past-oriented, though she is more clearly focusing on *negative* past events, while #46, scoring as being euthymic on the ISS, also reports being heavily influenced by both positive and negative events of the past:

> *"I feel guilty about some of the decisions I have made in my life…long-time guilt*" (#11)
> *"I think about the past a lot, good and bad" (#46)*

As temporal theory would expect, a more balanced view as reported by #46 should be connected to healthier functioning. Participant #113 commented on her preferred temporal outlook compared to other time frames:

> *"I also tend to dwell on the past not the present or future" (#113)*

Thus, many of those who commented on their time perspectives reported to be preoccupied by the past. By contrast, some of the participants wanted to convey that they have a more balanced view. Participant #69 describes exactly what temporal theory assumes to lead to be key to normal functioning, i.e. having a balanced time perspective profile so that we may draw on past, present or future depending on changing situations:

> *"Not applicable: I do not dwell on past events or worry about the future, but neither am I totally focussed on the present. Sometimes I think 'He who hesitates is lost'; at other times, 'Look before you leap!' "(#69)*

This comment is particularly interesting as it appears to support temporal theory, considering that #69 was classed as being euthymic at the time of filling out the questionnaire. According to Zimbardo & Boyd (1999) and TP theory, a more balanced time perspective profile should lead to a more 'balanced' well-being, as appears to be the case with #69.

Several other participants reinforced temporal theory's assumption of time perspective characteristics. Some participants described how their preferred time perspectives changed over time, or across situations, which is consistent with temporal theory which posits that our TP adapts to situational demands and may change across age groups. Participant #110 describes this change in the following way:

> "*Most of my answers to these questions vary a lot over time - right now, I am a lot more careful and considered about things compared to how I was in the past. Learned the hard way [sic]. Also older and more tired, I think." (#110)*
> *The same participant comments on the ZTPI in particular:*
> *"Maybe I am getting more balanced - I do think a lot about the past and can get upset by abuse and lost opportunities etc. but I also remember the good times and people. I have no wish to go back. I don't see that much difference between living in the present and remembering the past/planning the future. I plan my days and future but am able to change as things develop; having the plan gives me a base!" (#110)*

Again, as with participant #69, this statement is interesting as #110 is reflecting on being more balanced in terms of her temporal orientation and she scored as currently being euthymic. This connection between a balanced TP and healthy functioning is support for temporal theory.

Participant # 50 also describes how her temporal outlook changes according to the situation she is in, i.e. changes between a work settings and leisure time, just as is hypothesized in Zimbardo & Boyd (1999):

> *"Some of [my] responses would differ say for example from a working day to a day when you are not working i.e. it's important to have goals and plan at work but when I am at home I tend to let my mood dictate what the day is like - not always planning things but going with the flo [sic]." (#50)*

As temporal theory assumes, healthy functioning is dependent on the ability to switch between TP's according to situational demands. Some time perspectives are more productive in certain contexts than others. As described by #50, in a work context, it may be beneficial to work towards goals as opposed to seeking immediate gratification. However, after work, it is

beneficial to adopt a different mind-set that allows enjoyment of the present. This is precisely the effect this PhD aims to capture, i.e. the differences in time perspective underpinning mood and circumstances differentially, as described in the quote above.

Similarly, to #50, participant #101 describes her life split between her family and work. She describes herself as having the tendency to be present-hedonistic. However, depending on situational demands, a more future-orientated perspective appears to emerge in an attempt regain control:

> *"When I don't have to get up for any reason, I do not wake up at the same time. I do not schedule unless I have to. I prefer to float, but then it bites me in the ass [sic] and I schedule" (#101)*

This quote is particularly interesting as it shows the dynamic relationship between having certain preferential time perspectives, extending into dispositional styles that may turn into habitual styles or response tendencies as hypothesized by Zimbardo & Boyd (1999), the situations these help create and the subsequent influence the situations then have on our time perspectives. The comment taps into a potential link between time perspective being determined by external situational demand, habitual tendencies and personality.

Most interesting and relevant to this PhD are the connections participants drew between their preferred time perspective and their current moods. Overall, these statements seem to confirm the premise of this PhD, i.e. that temporal orientations underpin (extreme) mood states.

Participant #42, for example, highlights how her emotions affect her way of thinking and in particular, how anxiety limits her focus on the present/past:

> *"I have high anxiety, so that affects when and how I am able to think about the future. It's often easier to jump to something new than to think about the long-term." (#42)*

It is this interplay between temporal outlook, affect and cognition that the present research aims to demonstrate.

Similarly, #43 and #128 comment on the ZTPI and the relationship between time perspectives and their moods:

> *"Hard to answer because I have different answers to different moods?" (#43)*
> *"Again changeable dependent on mood" (#128)*

Additionally, and perhaps most pertinent to this PhD, participant #30 and #62 demonstrate clearly how their mood swings specifically are underpinned by changes in temporal outlook:

> "*I suffered sexual abuse from my uncle. My mother alternated between showering me with affection and playing mind games, consequently I swing from reliving the happy memories on good days and the traumatic ones on the bad days." (#30)*
> *And:*
> *"These surveys are difficult because the answers always depend on which mood state I'm considering in my answer. Even being objective in light of my current state, I know my answers vary often through my cycles." (#62)*

Especially the latter comment gives an insightful illustration of how the effect is experienced that this thesis aims to demonstrate mainly statistically: Temporal outlook, measured here in time perspective, underpins moods in bipolar disorder and thus varies with mood changes.
Lastly, some comments highlighted practical issues for the interpretation of the statistical results. #89 comments on the ZTPI:

> *"A lot of this changes with my medication levels"*

Considering that nearly all participants in this sample were on drugs to treat bipolar disorder, it must be kept in mind that medication may also hugely interfere with and confound the relationship between mood and time perspective that is measured in this study. #79 had a similar issue with the ZTPI:

> *"I'm not sure if these questions refer to my private life or my work life as the two would give quite different answers so the questions that were unclear about which aspect of my life they referred to I 'split the difference' (#79)*

This is not an issue for the current analysis per se as the ZTPI aims for respondents to 'split the difference', i.e. answer in a way that reflects general tendencies. However, it must be kept into consideration that the ZTPI is not sensitive to capturing time perspective differences in different contexts, experienced in the same day, for instance. This may have a confounding effect on answers when participants do not answer intuitively.
In summary, the comments from participants support several assumptions this PhD makes and provides additional support for the hypothesis that time perspective underpins mood states in bipolar disorder and hence varies between mood states. These comments complement the statistical analyses and provide further support for aspects of temporal theory, i.e. that a balanced time perspective may contribute to healthy functioning and changes according to situational demands.

V. Discussion

25. General Discussion

Time perspective (TP) is a cognitive individual difference variable that has been extremely successful as a predictor for a wide variety of psychological variables. The latter include outcome variables as diverse as behaviours (Hall et al., 2014; Sansbury et al., 2014; Zimbardo, Keough & Boyd, 1997; Wills et al., 2010; Laghi et al., 2012; Daugherty & Brase, 2012; Rothspan & Read, 1996; Chiattro & Vianello, 2013), attitudes (Cretu, 2012; Milfont & Gouveia, 2006), identity status (Laghi et al., 2013), mindfulness levels (Wittmann et al., 2014), suicidal ideation (Laghi et al., 2009), self-regulation (Zebardast et al., 2011), environmental values (Milfont & Gouveia, 2006), socio-economic status (Gutherie, Butler & Ward, 2009), aspects of social life and relationships (Zimbardo & Boyd, 1999), academic success (Zimbardo & Boyd, 1999), personality (Haghighatgoo, Besharat & Zebardast, 2011; Zimbarod & Boyd, 1999), life satisfaction (Drake et al., 2008), coping (Epel, Bandura & Zimbardo, 1999), and even processing speed (Nowack, Milfont & van der Meer, 2013) and simple habits such as wearing a wrist or making to-do- lists (Zimbardo & Boyd, 1999).

One field of study time perspective has not been applied to prior to the present research is psychiatric conditions, including affective disorders. This is surprising given the history of the concept of time perspective in that the conception of the Zimbardo Time Perspective Inventory (ZTPI, 1999), the most widely used scale to measure TP, was based on observations detailing rapid and drastic changes in mood in participants of the Stanford Prison Experiment (SPE; Hanley et al., 1973).

Judging from the sheer number and the variety of domains mentioned above that time perspective has predicted in past research, two possibilities emerge that must be considered in any type of new TP research such as the present study: Either the concept has been so successful in past research because there is a problem with the definition of the variable which makes it applicable to such a variety of outcome variables or it Zimbardo & Boyd's (1999) hypothesis that TP is underpinning all aspects of our experience is true- in which case TP should also be applicable to mood, the subject this PhD explores. These possibilities are discussed in more detail below.

The first possibility explaining TP's success as a predictor is that there is a problem with the construct TP itself which makes it applicable to such diverse aspects of life and psychological functioning. Specifically, it is possible that the TP is too broad to be valuable in every-day life

predictions. It may then be applicable to virtually all aspects of human experience, as Boniwell & Zimbardo (2004) claimed, but limited in what it can actually be of use for. Time perspective may relate to, and even predict, large quantities of variables including mood, but its actual usefulness and real-life application outside of research would be questionable. For example, the Zimbardo Time Perspective Inventory (ZTPI; 1999) yields scores from 1-5 for each of the five time perspectives. The question is what a score of 2.83, for instance, really means in practice. Is this individual more at-risk for the given outcome, e.g. risky driving behaviour? If so, how much more? Does 2.83 constitute a mild, moderate or severe risk? And is this a short-term, or long-term prediction of this behaviour? Another example helps to illustrate the issue further: Present-hedonistic TP has been linked to risky driving including speeding (Zimbardo, Keough & Boyd, 1997). Participants scoring higher on the PHTP subscale were also more likely to engage in risky driving, as well as in substance abuse (Daugherty & Brase, 2010; Fieulaine & Martinez, 2010) and sexual risk behaviours (Rothspan &Read, 1996). Predicting general tendencies may be valuable for risk group predictions of volitional behaviours but even less valuable in the context of bipolar disorder and predictions about triggers for mood episodes. Time perspective may not be specific enough to predict even when specific behaviours occurs. For example, a future-oriented individual is less likely to engage in speeding (Zimbardo, Keough &Boyd, 1997) - but circumstances may lead even the future-oriented person to break speed limits. A score of 2.83 on any TP subscale would mean little in the context of predicting this specific exception. The concept is too broad to be sensitive to such fluctuations and would be even less able to predict moods that are not under conscious control.

In summary, the first possibility of why time perspective has previously been associated with a large variety of psychological variables is that it may simply be a very broad concept that ultimately then has limited utility for specific real-life predictions.

The second possibility for why time perspective has been so successful in predicting such a diverse array of variables is that hypothesized by Zimbardo & Boyd (1999). The authors suggest that time perspective is such a 'fundamental and vital psychological construct' (in Milfont et al., 2008, 50) that it may underpin virtually all aspects of human experience (Boniwell & Zimbardo, 2004) and link concepts that have previously not been considered together in psychological research. This PhD research is testing their hypothesis by applying TP to the new domain of mood which has not previously studied in TP research.

The potential connection between TP and affect is plausible for two main reasons: First, as the convergent evidence in the literature review showed, time perspective has already been identified as a predictor for various aspects of bipolar disorder. Second, there is significant

theoretical overlap between the definitions of some of the time perspectives and acute mood episodes in bipolar disorder, i.e. present-hedonistic TP and mania. Thus, time perspective may be the cognitive process that underpins already known predictors of bipolar episodes, such as dysfunctional attitudes, and it may also cognitively underpin decision-making that leads to risky behaviour often present in mania, to name one example.

The first and second possibility of why time perspective has been so successful in past research relating it to a large variety of concepts do not necessarily exclude each other but warrant caution for the interpretation of the findings of this research. It may be the case that time perspective is, in fact, underpinning all areas of functioning as hypothesized by Zimbardo & Boyd (1999) but that this is due to the broad and unspecific nature of the concept which may limit its real-life clinical utility in terms of mood state predictions. Thus, as a secondary aim, this discussion will not only discuss the findings in terms of what the nature of the relationship between time perspective and mood is, but also assess its clinical utility in the context of bipolar disorder.

The next paragraphs function as a summary of the rationale behind the current research, as well as a discussion of its empirical findings. It also aims to synthesize the results of this research with available evidence from previous studies in order to come to a conclusion about the nature of the relationship between bipolar mood and time perspective, as well as a preliminary assessment of its potential clinical utility in this context.

The impetus for the idea behind applying time perspective, a cognitive individual difference variable, to mood came from observations made at the Stanford Prison experiment (SPE; Haney, Banks & Zimbardo, 1973). Specifically, one of the most surprising findings from the SPE reported was that the participants for this study had been carefully selected based on their scores on a variety of psychological measures that had deemed them to be 'the most average' and healthy out of all participants that had applied. However, these students who had been found to be mentally healthy and stable prior to the SPE appeared to develop severe symptoms of stress and depression after only 36 hours into the study. These symptoms occurred in response to the stressful environment the mock prison had created, both in terms of physical constraints enforced by the 'prison guard'-participants and the social dynamics between 'prisoners' and 'guards'. The rapid and drastic changes in participants' mood were later mentioned in the time perspective seminal paper by Zimbardo & Boyd (1999) in which they hypothesized that the SPE-participants had developed an extreme present TP bias, to the extent of dismissing their shared past and future, at the same time as the changes in affect were witnessed in nearly half of the prisoner-participants. The authors speculated that there may be a link between emotional stability or affect and time perspective. However, no studies to date

have been conducted and published that examined the variable in affective disorders. This is the gap in time perspective research this PhD aimed to fill.

If time perspective does indeed underpin mood, this relationship should be particularly measurable in bipolar disorder where the most extreme ends of the mood spectrum can be present. There are also further parallels between the SPE and bipolar disorder: The moods of roughly half of the participants in the prisoner role appeared to change relatively quickly and dramatically. Moreover, the healthy participants in the SPE displayed relatively rapid and unusually severe changes in affect, triggered by external stress, as can often be the case in bipolar disorder.

Ten questions on the nature of the relationship between mood and time perspective were answered with across three cross-sectional studies. They aimed to investigate three main goals: First, it aimed to establish whether or not the cognitive variable time perspective, conceptualized by Zimbardo & Boyd (1999), statistically underpins manic, depressive, mixed and euthymic mood states in bipolar disorders. Second, it aimed to establish whether TP also predicts bipolar mood states. Third, it aimed to shed light on specific aspects of the relationship between mood and TP, e.g. whether time perspectives differ from ideal TP values when individuals are currently symptomatic as opposed to when they are not, if TPs are similar in healthy adults and adults with bipolar in remission and whether or not TP also predicts hypomanic personality. The ten research questions and empirical data are discussed in more details in the following paragraph.

26. Discussion by research question

26.1. Question 1: Are the five time perspective means significantly different between symptomatic bipolar adults (of sample 1+ 3) and healthy adults (entire sample 2)?

The first research question investigated the differences in time perspective means across all three samples, i.e. two samples with adults currently experiencing bipolar depressed, manic or mixed mood phases and one control sample with healthy adults. The purpose of this analysis was to establish whether or not adults with bipolar disorder differed significantly from healthy adults with no mental health diagnosis in terms of their time perspectives.

The question's underlying rationale to be tested was twofold: Firstly, it assumed that time perspective differs significantly in normal versus abnormal (extreme) moods. Secondly, as a

consequence, time perspective has utility in the predicting bipolar mood episodes. This assumption is based on time perspective theory (Zimbardo & Boyd,1999) which posits that a balanced time perspective profile underpins optimal psychological functioning. The opposite of a balanced profile is a time perspective bias, i.e. an extreme focus on either the past, present or future (Boniwell, 2010). Where such biases exist, we cannot flexibly adapt situational demands. For example, applied in an academic setting, a future TP is advantageous in that it encompasses the ability to delay immediate gratification. Instead, emphasis is being put on attaining more significant or larger rewards in the future (Zimbardo & Keough, 1997). The same TP applied to leisure time may be disadvantageous. If time perspective does indeed underpin mood, the effect should be particularly measurable in the extreme ends of the spectrum. Since these (mania and depression) represent abnormal and dysfunctional moods, the effect should also be particularly measurable because time perspective biases (i.e. extreme TP scores) should predict abnormal functioning (Zimbardo & Boyd,1999; Boniwell, 2010). Maladaptive, extreme mood should be underpinned by extreme time perspective scores, or TP biases, if temporal theory is applicable to bipolar moods (Boniwell, 2010).

The first research question is answering whether or not there are statistically significant differences between normal and abnormal mood to begin with. An inspection of the mean scores in the analysis revealed an interesting pattern. Bipolar participants in both samples scored higher than healthy individuals in all time perspectives apart from future TP and past-positive TP. Bipolar adults appear to be more present-hedonistic –oriented, which is expected given the overlap with this carefree, impulsive attitude towards the present with the symptoms often observed in (hypo-) mania (Zimbardo & Boyd, 1999). Additionally, the bipolar participants were also higher in past-negative attitude, a (time) perspective that is closely related to depression, rumination, trauma or neuroticism (Zimbardo & Boyd, 1999). A lower future- TP is also linked to depression negatively in that FTP represents a positive outlook comparable to hopefulness (Carelli, Wiberg & Wiberg, 2011). A low future-TP is also likely to be found in bipolar participants given the fact that they often show in impairment to simulate future scenarios which uses the same neural network as episodic memory, an area of general impairment in bipolar disorder (King et al., 2011). There is some debate as to whether or not future TP directly contributes to well-being. This has been refuted in some studies (e.g. Boniwell, Osin, Linley & Ivanchenko, 2010; Drake et al., 2008; Foret & Steger, 2004; Tov, 2004) but given the fact that FTP is linked to several positive outcomes including higher academic success and socio-economic status, it is likely that it is crucial for long-term happiness but may not immediately contribute to short-term life satisfaction due to sacrifices made in order to gain future reward (Kahana & Kahana, 1983; Wills, Sandy & Yaeger, 2001).

Finally, participants in the bipolar samples also had a more fatalistic outlook. This time perspective represents the perceived loss of control over one's situation or condition. Combined with a high past-negative attitude, this TP combination is likely to contribute to a predisposing individuals to depressive tendencies. Additionally, bipolar adults also showed to have lower past-positive scores than healthy controls; a TP reflecting a warm, nostalgic and positive attitude towards their past. Nostalgia and this TP is of particular importance as it has shown to buffer depression (Juhl et al., 2010).

In summary, having a low past-positive and future TP, paired with high fatalism, high present-hedonistic TP and past-negative TP is a particularly defective combination as it is marked by higher potential for depression, lower coping strategies to buffer stress and a higher feeling of a lack of control, compared to healthy individuals. Taken all results together, the bipolar time perspective profile is likely to be the worst combination of TP's and not surprising to underpin psychopathology.

In addition to establishing the TP pattern in bipolar disorder, the multivariate analysis of variance in research question also investigated whether or not the differences observed between healthy and bipolar adults is *significantly different*. The overall model with all five time perspectives was significant, indicating that the ZTPI (1999) measuring the complete time perspective profile of an individual is capable of distinguishing between healthy and symptomatic bipolar adults. When considered separately, all time perspectives were highly significant, indicating that they were statistically different across the three groups. The post-hoc test was the most interesting part as this confirmed where these significant differences were. It was expected that the time perspective differences would be significant between the symptomatic adults of study 1 and healthy adults of study 2, as well as healthy adults of study 2+ and symptomatic bipolar adults in study 3, but that the differences in time perspectives between sample 1+3 is not significant, i.e. the differences would lie between each of the two bipolar samples and the healthy sample, but not between the two bipolar samples. This was indeed the case for all time perspectives indicating that TP's were similar in both bipolar samples but time perspectives differ between healthy and bipolar adults. This analysis is first evidence for time perspective underpinning normal and abnormal functioning in the context of bipolar disorder differentially. In turn, this gave confidence for further analysis into the nature of the relationship between (extreme) moods and time perspective. The findings overall support temporal theory which predicts that healthy and unhealthy behaviour and attitudes should be underpinned by differential time perspective profiles: Biases should predict maladaptive and unhealthy functioning at large (Zimbardo & Boyd, 1999). However, the theory does not expand on what aspects of psychological functioning are affected. The results

of this first analysis expand on temporal theory in that it suggests that healthy versus unhealthy mood also appears to be underpinned by time perspective differentially and that mood can be predicted by TP biases. The same principles TP theory lays out also appear to apply to bipolar mood. The first question established that time perspective is indeed significantly different in symptomatic bipolar and healthy adults. Individuals currently experiencing abnormal mood episodes differ significantly from normal adults in terms of their time perspective scores.

26.2. Question 2: Are the time perspective means of the euthymic participants of both bipolar samples (study 1 and 3) significantly different from the TP means of the sample of adults without mental health diagnoses (study 2)?

Research question two aimed to establish whether or not the time perspective differences were also present between individuals in remission and healthy adults, i.e. whether there are trait differences between bipolar and healthy adults in terms of the time perspective profiles or whether the differences are state specific and only occur when mood becomes abnormal. The purpose of this analysis is thus also to establish if individuals in remission 'return' to healthy functioning that is comparable to the healthy adults or if time perspective in bipolar disorder is always significantly different from healthy TP's, even in remission, and is thus a trait specific to bipolar disorder.

The multivariate analysis of variance used for question two revealed that only past-negative TP was significantly different across groups. However, looking more closely at where those differences were, the multivariate comparison post-hoc test showed that past-negative TP was only significant between study 2 and 3, i.e. the healthy adults compared to one euthymic bipolar sample, but not between the other euthymic bipolar sample and healthy adults (euthymic adults of study 1 and all adults of study 2). For the measured significant difference to reflect a genuine and robust effect, however, one would expect the difference between sample 1 and 2 (the other euthymic bipolar sample versus healthy control group) also to be significant. Because this was not the case, the results are unclear and need to be treated with caution.

For the rest of the data and time perspectives, there were no significant differences across any of the groups, meaning that time perspectives between euthymic and healthy adults are similar. Thus, overall, individuals in remission appear to 'return' to normal time perspective values.

These results furthermore suggest that time perspectives are indeed changing when individuals become symptomatic, compared to their 'baseline' TP values in remission-periods.

26.3. Question 4 and 4

3. Are the TP means of symptomatic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?
And
4. Are the TP means of euthymic bipolar adults significantly different from the ideal TP values reported by Zimbardo (2012)?

Time perspective theory posits that a balanced time perspective profile is necessary for positive functioning and well-being (Boniwell, 2010). Time perspective biases, i.e. extreme scores, should lead to maladaptive functioning due to the rigidity and extreme focus on one temporal orientation that does not allow for flexible adjustment to situational demands (Zimbardo & Keough, 1997; Zobel et al., 2004).. The scores that Zimbardo believes to be ideal and making up a balanced time perspective profile were published on his website in 2012. The website states that these scores have been calculated based on all data collected so far though it is unclear from what data exactly these scores have been calculated. Consequently, the results of this analysis tests part of temporal theory but needs to be interpreted and treated with caution as it is unclear how the ideal scores were derived.

One-sample t-tests were conducted to investigate whether or not the time perspective mean scores in euthymic and symptomatic bipolar adults would differ significantly from the ideal scores. Neither sample was close to the recommended ideal scores on any of the time perspectives, apart from the future TP in euthymic adults, i.e. individuals in remission still have a time perspective profile that is considered to be not ideal according to temporal theory, apart from the future TP. Comparing the means in FTP between euthymic and symptomatic participants suggests that bipolar adults in remission gain a stronger future perspective. Since this was the only difference between euthymic and symptomatic individuals, future time perspective gains a particular importance in the context of bipolar disorder and relapse prevention. Strengthening an outlook toward the future, the ability to work towards a long

term goal inhibiting impulsive rash decisions and behaviours appears to be a key aspect to contribute to remission.

26.4. Research question 5: Does time perspective (TP) underpin manic, depressed, mixed mood and euthymia in bipolar disorder differentially? Is TP able to differentiate between these episodes?

This part of the analysis aimed to investigate whether or not time perspective was significantly different in (hypo-) mania, depression, mixed mood and remission. A one-way between participants multivariate analysis of variance was conducted in a sample of both symptomatic and asymptomatic bipolar participants for this purpose. The MANOVA model with all five time perspectives was significant, indicating that the combined time perspectives, or the composite variable comprised of all five time perspective, could indeed differentiate between mood states in bipolar disorder. This was first evidence for time perspective not only being different between healthy and bipolar individuals, but also underpinning the individual mood states differentially.

However, when considered separately, only past-negative TP and present-hedonistic TP appeared to be statistically different in all four mood states. Adults in mixed mood states reported to have the highest past-negative perspectives. Past-negative has been associated with a variety of negative outcomes and can be due to trauma. It is associated with neuroticism and depression and thus can be expected to be high in mixed moods. Thus, it appears as though past-negative TP and present-hedonistic TP (conceptually mostly related to depression and mania respectively) account for the measured overall significant differentiating effect established with the model including all TP's compared to a null model.

Manic participants scored highest in present-hedonism which is not surprising as a present-hedonistic outlook describes features of (hypo) mania, including impulsiveness, and a happy-go-lucky, fun-seeking attitude.

Euthymic adults had both the lowest present-hedonistic TP's and past-negative TP's. This suggests that past-negative and present-hedonistic TP are a particularly important factor in deciding whether someone is in the acute mood episodes group, as opposed to the euthymic group. These are the two time perspectives that differ from being the lowest in remission and the highest in two acute mood states, thus changing quite drastically between relatively normal and abnormal functioning in bipolar disorder.

26.5. *Questions 6 and 7*

6. Can time perspective predict manic, depressed, mixed and euthymic mood states in bipolar disorder?
And
7. Can time perspective predict mood states in bipolar over and above other already established predictors of acute mood states in the disorder (BIS/BAS sensitivity and impulsiveness)?

The main goal of this PhD was to establish whether or not time perspective is a predictor of mood states in bipolar disorder. If this was the case, it could be used in psycho-education, relapse prevention and mood-monitoring. This multinominal logistic regression was conducted to answer this question. Two other variables that are already known to predict mood states in bipolar disorder, BIS/BAS sensitivity and impulsiveness, were also considered in this regression model so that their predictive utility and power could be compared to that of time perspective.

The overall model with BIS/BAS activity, impulsiveness and time perspective did predict mood states in this sample of symptomatic and asymptomatic bipolar adults. However, only future time perspective had a significant overall effect on mood state prediction, along with attentional impulsiveness. The latter was the only variable in the model that remained significant when inspecting which mood states separate variables predicted. Attentional impulsiveness alone predicted mania and mixed moods positively. Overall, the model only classified 52.1 % of all cases correctly in terms of their membership in one of the four mood-state 'groups'. Thus, though it is a significant model, it is not classifying enough cases correctly to be of significant clinical value.

26.6. Question 8: Can the effect observed in research question 7 be replicated in a second, independent and bigger sample of bipolar adults (study 3)?

Research question 8 is a replication study of research question 7 and aimed to establish test-retest reliability of the results. In the analysis for research question 7, time perspective emerged

as a significant predictor of mood states in bipolar disorder. However, the effect was relatively small. Additionally, time perspective was outperformed by attentional impulsiveness which was the only variable in the model that remained significant when individual contributions to the multinominal logistic regression model were inspected.

Research question 8 served the main purpose of replicating the regression analysis in a second larger, independent sample in order to establish whether the measured effect in research question 7 was due to sample characteristics (such as the relatively small sample) or a genuine effect.

A multiple nominal logistic regression was conducted on the complete sample of study 3 with both symptomatic and asymptomatic adults with bipolar disorder (N=514). Though the model had slightly unbalanced sample sizes, this is not an issue in multinominal logistic regression as long as the cell sizes are larger than the number of explanatory variables (i.e. 5 TP's).

The overall model was a good fit to the data and significant. The ZTPI (1999) hence does appear to predict mood states in bipolar disorder. This finding is a replication of the previous finding of research question 7. However, the ZTPI in practice only calculates five subscale scores that each need to be considered separately. There is no overall score of one's time perspective. Thus, what is most important on a practical level is to see what the individual time perspectives contribute to the model, i.e. how well each subscale can predict mood states. This was revealed in the post-hoc multiple comparisons.

The present-hedonistic time perspective, manifesting itself in gregarious, excitement-seeking and impulsive attitudes or personalities, positively predicted (hypo-) mania in this sample. Given the overlap between the characteristics of both concepts, this is an expected and plausible finding. However, the effect is not as strong as one might expect given this strong conceptual overlap: For every one unit increase on future time perspective (The TP sub-scale score range only from 1-5), there is an increase of 0.7 to be manic as opposed to be euthymic in the sample of study 3. In the smaller sample of study 1, PHTP did not predict mania (see research question 6). One possible explanation for the small effect despite considerable overlap of PHTP and mania characteristics might be the fact that mania is actually not just a state of elation and euphoria, but may also be marked by irritability and dysphoria, which is not captured in the present hedonistic TP (Johnson et al., 2005; Power, 2005).

By contrast, future time perspective in this sample was also a significant individual predictor of both depression and mixed mood state. This finding is complementing the previous multinominal logistic regression in the smaller bipolar sample (study 1) used in research questions 6 and 7: In the latter, future time perspective was also overall a significant unique predictor of moods in bipolar disorder overall; however, it did not reach significance in post-

hoc tests. Depression was negatively predicted by a future-outlook, as one would expect given the literature about hopelessness in depression (King et al., 2011). This relationship was the strongest in the analysis as the likelihood of being depressed increased by 1.28 for every one point decrease on the future subscale of the ZTPI (1999). Future time perspective means an ability to work towards goals in the future at the cost of having to delay immediate rewards. It implies the ability to control urges and impulses and the items on this subscale imply a certain positive view towards the future (Boniwell et al., 2010). Unfortunately, a long known issue of the ZTPI (1999) is that it is unable to distinguish between anxious, worried future outlooks and hopefulness. It captures a largely optimistic and hopeful attitude and thus it is not surprising that it is negatively correlated with depression (Carelli et al., 2011). Future time perspective in this sample also negatively predicted mixed mood states. Past-negative TP also positively predicted mixed moods.

In conclusion, the bigger sample investigating the predictive utility of time perspective was a lot more successful than the smaller sample of study 1 in that multiple time perspectives emerged as bipolar mood state predictors. These predictions are in line with existing evidence and time perspective theory in general (Rothspan & Read, 1996). However, again, as in the previous analyses of this research, the overall model explained a very small proportion of the variance in classification scores (approx. 16%) and only 46% of all cases were correctly classified into the 'correct', observed mood state categories. Thus, even though the predictions were significant, they may be of little value for clinical practice. Instead, the results are promising enough for further research investigating time perspective as part of predictive models including additional predictors. Mood episodes in this condition are naturally complex and determined by an interplay between genetics, cognitive factors, personality and external stressors (Mansell et al., 2008). It is thus unlikely one variable alone will predict large amount of the variance in mood scores.

26.7. Questions 9 and 10:

9. Can time perspective predict Hypomanic Personality Scores?

And

10. Which of the time perspectives predicts Hypomanic Personality Scores best?

A multiple regression analysis was conducted to establish whether or not time perspective may also predict risk to developing bipolar disorder in a healthy sample. The rationale behind this analysis is based on available time perspective evidence which has successfully linked time perspective to personality types and traits. The hypomanic personality describes character traits associated with subthresold-mania (APA, 2013). These include high energy, sociable types of people that may also show signs of irritability, entitlement, risk taking and impulsiveness that is often witnessed in acute bipolar disorder (Schalet, Durbin & Revelle, 2011). Perhaps partly as a consequence of such traits, high scorers on hypomanic personality scales report to have more friction with significant others, but also less anxiety in stressful situations (Eckblad & Chapman, 1986).

The present-hedonistic time perspective also reflects a risk-taking, careless and impulsive attitude to time and life (Zimbardo & Boyd, 1999). The corresponding items in the ZTPI tap into the tendency to lose track of time and getting bored easily, acting on impulse and 'following one's heart instead of one's head'. Thus, there is considerable overlap with hypomania and it was expected that present-hedonistic TP scores would predict hypomanic HPS-scores, which was indeed the case. Hypomanic personality was predicted by present-hedonistic scores, as well as past-negative time perspective, suggesting a negative, depressive and neurotic undertone to the otherwise superficially 'fun' hypomanic personality.

The significance of time perspective predicting hypomanic personality lies in the fact that individuals considered high risk for developing bipolar disorder, i.e. a (hypo-) manic episode, could be predicted by TP scores and the ZTPI (1999). However, again, the effect sizes of these predictive relationships were small. Only 9% and 5% percent of the variance in HPS-scores was predicted by present-hedonistic TP and past-negative TP respectively. Thus, TP may be of little value for clinical practice if considered on its own.

27. Considerations concerning Demographic Data

The samples in this research were biased in that they consisted to a large extent of Female participants of Western Cultures. The Demographic Data collected were analysed in order to establish whether or not these factors could have influenced the results, given that there are assumed links between them and time perspective. There are several variables that have been found to influence time perspective and that consequently have the potential to bias the results obtained in the present study. These factors include gender, culture, age, and even variables like political views and whether or not participants volunteer to take part in studies or not (Harber, Zimbardo & Boyd, 2003; Sircova et al., 2007). Some of these variables that are known to influence TP also interact. For example, Harber and colleagues (2003) found that individuals self-selecting themselves to take part in research and finished it early had particularly high future TP scores, compared to those that took longer to complete the study. The added factor of gender was able to predict who was more or less likely to sign up sooner, follow through with long-term participation and finish the study earlier: Females high in future TP signed up and finished the study earlier when compared to male participants (Harber et al., 2003). Self-selection for participation, as well as gender, thus had an impact on which time perspectives were dominant. Further variables that are believed to influence time perspective are social class, culture, education, religion, family models, and occupation that may contribute to individuals being orientated towards the present or future (Levine, 1997; Harber et al., 2003).

There is mixed data available with regards to cultural differences in TP. Zimbardo & Boyd (1999) suggest that TP is learned and thus depends on factors that were relevant to one's environment while growing up. Zimbardo compares the differences between his Italian culture and the North American culture he is experiencing at present, living in the United States of America. From his own experience, he suspects that the Italian culture places greater emphasis on family and traditions and should thus show higher past and present TP scores, while the American culture is much more orientated towards the future. However, there is no data in this paper to support the claims. Other authors have since addressed these claims in a limited amount of studies. For example, in the International Time Perspective Research Project these differences were investigated for the first time (Sircova et al., 2014). In this project, time perspectives were measured in 24 countries. The results showed a cross-cultural invariance of 36 of the 56 items on the ZTPI scale. In a different study, Sircova et al (2007) compared ZTPI results of 1136 participants between 14-81 from Russia and France. They found that women have higher Past Positive and Present Fatalistic TP scores across cultures and that people living

in large cities score higher on Present Hedonistic TP and lower on future TP than those living in smaller cities in both countries.

Time perspective differences have also been noted across several other variables that were not measured in this study, including political parties. There may also be a self-selection bias in terms of TP, given that future-oriented participants have been found to be more likely to participate in research (Harber, Zimbardo & Boyd, 2003). These are just some of the variables that may impact on TP's and bias the results of the present study. Few of these were actually measured in this PhD, i.e. age, country of permanent residence and gender.

Overall, even with the knowledge of time perspective being influenced by a multitude of variables, it is difficult to differentiate their influence and account for the interaction between them. Limited demographic data were collected in the present study which have previously been found to influence time perspective preferences. The relevant collected demographic data include age, gender and country of permanent residence. The latter is not directly relevant in that it is culture that is believed to have an influence on time perspective preferences (Sircova et al.,2007). The country of permanent residence may not be the same that the participant grew up in and thus it is unclear what effect the culture has that one is currently living in if this was not the culture one grew up with. Time perspective is believed to be learned (Zimbardo & Boyd, 1999) and thus it is likely that early years in relation to culture have a significant influence on developed TP preferences.

Overall, the results collected for the three studies suggest that the age categories in all three studies were reasonably balanced. All three samples were biased in terms of participants' gender, i.e. most were female. However, time perspective total score-means did not differ significantly between males and females in any of the samples. Therefore, gender may not have had a major impact on the data collected in this research. In terms of culture, it is difficult to generalise the results obtained in any of the studies, given that the vast majority of participants lived in Western cultures.

28. An Integrated Model of Time Perspective in Bipolar Disorder

Both the qualitative and quantitative data help to illustrate for the first time how time perspective may operate in bipolar disorder. The first question was whether or not TP underpins mood states in bipolar disorder in the first place. The comments participants left during the course of filling in the questionnaire pack in the present study allowed for an

informal glimpse into how they perceived the relationship between TP and their mood fluctuations, providing first support for the existence of such a relationship.

Several participants reported to ruminate often and having a past-TP focus in general. These participants were currently symptomatic. In line with temporal theory, TP biases should be linked to maladaptive psychological functioning. Further support for the theory was provided by euthymic participants who reported that they would often switch between TP's, i.e. swing from a past-focus to present or future TP's. Most importantly to the present research, they showed awareness that their TP's varied depending on their current mood, but also on external factors such as medication levels and context, i.e. work as opposed to home life. Some participants also described that heir TP appeared to be influenced by anxiety but that their temporal outlook generally fluctuates with their mood cycles.

The qualitative data can only serve illustrative purposes but provided a first insight into the relationship between how the connection between time perspective and mood was experienced by some of the participants. This was further explored systematically in the statistical analysis of the research questions. The results obtained in the quantitative analysis help to paint a first picture of the nature of time perspective in bipolar disorder. The following paragraph gives a summary overview of the time perspective profile in bipolar disorder compared to adults without mental health diagnoses, based on the findings of the present research.

The first research question established that time perspective profiles are indeed significantly different between symptomatic bipolar adults and healthy participants. This was confirmed by having two bipolar samples, both being similar to each other in TP, but different to the healthy sample in this project. Interestingly, these differences in TP between healthy and non-healthy participants are not present in remission, i.e. adults with the condition 'return' to TP scores similar to healthy adults when currently not experiencing an acute mood episode. Together, these results suggest that time perspective scores may be state specific as opposed to trait-specific. Time perspective scores appear to be deviating from the normal population only when acute mood episodes are experienced. This, in turn, suggests that time perspective does, in fact, underpin various intensities of mood differentially. In other words, time perspective was sensitive to normal and abnormal mood.

The results also gave insight into the specific make up of time perspective profiles in healthy versus non-healthy adults. The bipolar disorder participants showed to have the most concerning profile with lower future-focus and greater hopelessness, more focus on negative experience, a greater feeling of an external locus of control as well as less protection from depression in the form of a nostalgic, warm and positive recall of past experience. Time perspective in adults with bipolar that are currently experiencing acute mood symptoms

deviates substantially from the TP values suggested to be ideal (Zimbardo, 2012). In remission, their TP values are still substantially different from the ideal values, with the exception of future TP, which is similar to what is believed to be ideal. Considering that euthymic individuals appear to have TP's similar to healthy adults, and the ideal TP are believed to be underpinning healthy functioning, it is possible that the future TP is so important that it is an important contributor to determining whether or not someone is currently in remission or experiencing abnormal mood.

The next line of questions aimed to establish whether time perspective would also qualitatively differ between the various mood states experienced in bipolar disorder. The results indicate that TP also underpins bipolar depression, (hypo-) mania and mixed mood states differentially. The five time perspectives, i.e. the ZTPI, is able to differentiate between the mood episodes. However, when considered separately, only the present-hedonistic TP and past-negative TP were significant. Both have considerable conceptual overlap with mania and depression respectively. Euthymic participants were lowest in these TP's.

In terms of predicting whether someone was currently experiencing depression, mixed mood or mania as opposed to euthymia, the future TP again emerged as the only significant TP when considered separately. The full model with all TP's, i.e. the ZTPI, could significantly predict current mood. However, the amount of variance explained by this model was relatively small, 52.1%, and may thus not be suitable for clinical practice. Additionally, attentional impulsiveness was the other significant predictor of current mood states and explained slightly more variance than TP.

In a second bipolar sample, PHTP again emerged as a predictor of mania, although surprisingly had relatively little influence on the risk of being classed as manic as opposed to euthymic. This is surprising given the conceptual overlap PHTP and mania have. However, the result may be explained by the fact that mania is not always of the euphoric type but may also include irritability that is not captured by this TP. FTP again predicted depression and mixed mood negatively. PHTP and PNTP also predicted hypomanic personality, perhaps supporting this hypothesis, i.e. that (hypo-) manic tendencies are not only underpinned by fun- and thrill-seeking attitudes but also carry a negative undertone in the form of a focus on negative adverse experiences in the past. The results of this analysis would thus suggest that the overarching hyperactive, 'fun' hypomanic personality is also underpinned by an underlying degree of depressive tendencies, or is, at the very least, not consistently carefree and happy. This is consistent with a large body of evidence that also found hypomanic personality to be associated with both mania and depression. The 'manic defence hypothesis', for example, explains this apparent contradiction with the possibility of the sometimes overly

energetic and euphoric tendencies of mania being an overcompensation and defence strategy for coping with an underlying depression (see Meyer, 2002).

28.1. Summary: Time Perspective in Bipolar Disorder

- All five TP's are significantly different in healthy participants compared to those that reported to be currently experiencing (hypo-)mania, bipolar depression or mixed mood states
- Adults with bipolar disorder compared to healthy adults have a concerning TP profile with lower future and past-positive TP, but higher past-negative and present TP's.
- Euthymic adults have similar TP's to healthy adults
- TP's of symptomatic bipolar adults differ significantly from ideal suggested TP profiles
- TP's of euthymic bipolar adults also differ from ideal TP profiles, with the exception of the FTP, which is similar to the ideal value
- Within bipolar disorder, TP underpins (hypo-)mania, depression, mixed mood and euthymia differentially
- A model with all five TP's together is capable of predicting those acute mood states in bipolar disorder. However, correctly classified cases are relatively low (52.1%).
- PHTP and PNTP predict hypomanic personality scores

29. BAS Dysregulation and Time Perspective

The BAS Dysregulation model (Depue & Iacano, 1989) assumes that individuals with bipolar disorder are particularly sensitive to reward and punishment-cues in their environment. They are believed to spot these cues which will activate their overly sensitive BIS/BAS system.(Depue & Iacono, 1989). The latter will assess the situation, decide whether the stimulus is seen as a reward or punishment and will then initiate approach- or withdrawal behaviour, depending on the individual's goals and situation. These processes are likely to require cognitive appraisal, yet the process of this is poorly defined in the theory (Urosevic et

al., 2012). Time perspective as a cognitive individual difference variable may offer an opportunity within the BAS Dysregulation model of bipolar disorder to measure what an individual may find rewarding and where they may place their preference when selecting behaviours. A present-oriented person may, for example, be more likely to choose action based instant reward, sensation and thrill-seeking (Zimbardo & Boyd, 1999). A future-oriented person is more likely to choose behaviour that includes delaying reward in order to gain bigger reward in the future; even at the cost of losing out on immediate pleasure. Although we all draw on each of the five time perspectives at times depending on situational demands (Zimbardo & Boyd, 1999), temporal theory posits that we develop certain preferences for one or more time perspectives. The more often we use them, the more they may become habitual. When they are applied across circumstances and inflexibly regardless of situational demands, time perspective biases develop. These are believed to be maladaptive to healthy psychological functioning (Boniwell, 2010) and can further develop into dispositional cognitive response styles (Zimbardo & Boyd, 1999). The more engrained these biases are, the more they can become part of our personality, given that they are believed to underpin all of our decision-making. In the light of the findings of this research, this is particularly worrying given that adults with bipolar disorder appeared to have the most maladaptive combination of time perspectives when in acute mood episodes: They were high in hopelessness and low in nostalgia which is known for being able to buffer the effect of depression (Juhl et al., 2010). They were also high in terms of their past-negative TP scores indicative of traumatic recall of adverse events, and they had high present-fatalistic scores. However, it appears that these TP's become particularly strong, or biased, when individuals are in cute mood phases and they return to more balanced scores when in remission. This suggests that time perspective may be best conceptualised as a trait-like variable that can turn into dispositional style the more often it is used. In the case of bipolar mood, it is thus possible that the more often or the longer one is experiencing an acute mood episode, the more the cognitive profile found in the present research may turn into dispositional style. This may be in line with previous work around the long-term effects of experiencing bipolar mood (e.g. Power, 2005). Within the BAS Dysregulation model, it is possible that such dispositional styles are involved in goal appraisal and progress monitoring which is believed to be at the heart of affect regulation (Depue & Iacano, 1989). Depression, for example, has been linked to a high past TP and a low future TP in the present study. When euthymic, individuals appear to return to a higher future TP level. Time perspective theory assumes that this influences their decision-making: The individual may start planning for longer-term goals but may lose this ambition and hope when depressed (compare Zimbardo & Keough, 1997). This is in line with general presentations of depression

(APA, 2013). Based on these cognitive appraisals and decision-making tendencies, the BIS/BAS system may then initiate approach or withdrawal behaviour.

30. The Bipolar Time Perspective Profile: Discussion of the findings in the light of previous research

30.1. Discussion by Time Perspective

Compared to participants without mental health diagnoses, adults in both bipolar samples recruited for this PhD research scored higher on both present TP's and past-negative TP, but lower than healthy adults in terms of their past-positive and future TP. Taken together, this is the potentially most maladaptive pattern of high and low scores. The next section will serve to illustrate what makes the established TP profile in bipolar disorder concerning, given results of previous research.

30.1.1. Future TP

The future TP appears to have a significant role in bipolar disorder. Compared to healthy adults, it is lower in both bipolar samples. This may partly be explained with the finding that bipolar adults have trouble imagining future scenarios as such simulations require the same neural network involved in episodic memory, which is known to be impaired in bipolar disorder (King et al., 2011). Overall, there is some debate around future TP and well-being in general. The future TP is ambivalent in terms of short- and long-term outcomes, similar to present-hedonistic TP. The future TP subscale of the ZTPI is heavily positively loaded, measuring a positive and hopeful attitude towards the future (Carelli, Wiberg & Wiberg, 2011). At the same time as measuring an attitude, it also appears to tap into an ability to delay rewards and work towards bigger, long-term goals. As such, this TP predicts behaviours that require self-control, such as adhering to medicine routines, resisting temptation and urges, controlling impulsiveness and practising behaviour that is less enjoyable, but leads to more long-term reward (Hall et al., 2004; Sansbury et al., 2014; Daugherty & Brase, 2010; Rothspan & Read, 1999). It should thus be negatively related to mania. This association was not found in the present samples. Notably, future time perspective is linked to many positive outcomes such as higher education and socio-economic status. It is linked to symptoms of mania, such

as a negative association to novelty- and sensation-seeking and less time invested in interpersonal connections (Zimbardo & Boyd, 1999). An extreme focus on this TP may also be related to attentional difficulties. Mindset-switching studies (Hamilton et al., 2011) have provided evidence for the possibility of time perspective being regulated by executive function. Future TP, in turn, is believed to lead to an inability to 'switch off' and worry about potential outcomes and future scenarios. If this was the case, an extreme future TP may exhaust executive resources more than others and thus lead to compromises in terms of cognitive or attentional abilities. However, there is evidence to contradict this hypothesis. Nowack, Milfont & van der Meer (2013) conducted an experiment on reaction times and found that future-oriented participants invested more cognitive resources in the task and outperformed present-oriented individuals. Overall, the future time perspective has been associated with a variety of positive outcomes, yet, surprisingly it has not directly been linked to positive outcomes in well-being (Boniwell et al., 2010; Drake et al., 2008; Foret, Steger& Frazier, 2004; Tov, 2004). Future TP entails the ability to delay rewards in order to gain bigger rewards in the future and a preference for doing so. This has a range of positive outcomes, such as better academic outcome, reduced risk behaviour (Boniwell, 2009), higher status (Zimbardo & Boyd, 1999), better health and many other variables that let Kahana & Kahana (1983) and Wills, Sandy & Yaeger (2001) conclude that it is vital to well-being. It appears that future TP ensures that individuals build up resources that are needed as a basis for well-being. However, this comes at a cost that can include short-term, immediate well-being. Pleasure, fun and social life, for example, are places second in extremely future-focused individuals. They may find it difficult to switch off and relax and they report having less contact with loved ones than present-oriented people, for example (Zimbardo & Boyd, 1999).

The future time perspective has most consistently been linked to positive long-term outcomes. It measures a positive, optimistic attitude towards the future, as well as an ability to delay rewards. Consequently, it has also been linked to a range of behaviours that involve the capability to resist temptation and urges for longer term reward, such as health benefits. It has previously been shown to predict health behaviours (Hall et al., 2014; Sansbury et al., 2014; Laghi et al., 2009; Daugherty & Brase, 2010), taking less risks (Rothspan & Read, 1996; Hutton et al., 1999 in Zimbardo & Boyd, 1999), self-reported well-being-seeking (Zebardast et al., 2011) and the achievement of an integrated identity (Laghi et al., 2013). Furthermore, it underpins conscientiousness, higher academic achievement and socio-economic status (Zimbardo & Boyd, 1999). However, the benefits associated with a strong future time perspective come at the cost of a less extensive social life and less time for leisure activities, which may impact negatively on well-being. This explains why a future TP does not predict

overall well-being (Tov, 2004) despite the positive outcomes it has been associated with. On the other hand, future time perspective captures a hopeful and optimistic view of imagined future scenarios and thus is negatively related to depression (Zimbardo & Boyd, 1999). In a diary study with depressed patients, the future time perspective was thus strengthened by writing exercises in order to increase a hopeful future outlook believed to reduce depression (in Zimbardo & Boyd 1999). Overall, future TP is likely to be needed for long-term health and well-being but this should ideally be balanced by an ability to 'switch off' and enjoy the present without calculating possible outcomes. Healthy participants were higher in this variable linked to a hopeful attitude, conscientious approach to goals and ability to delay rewards to attain bigger future rewards.

In line with this is the finding of the current research that all five TP's in bipolar adults were significantly different from ideal TP's, even in euthymia. However, future TP was the only exception which *was* similar to the ideal value in euthymia only. Thus, future TP may be of particular importance, contributing to whether someone is currently in remission or experiencing acute mood episodes. Future TP also contributed significantly to the prediction of mood states in bipolar disorder within a model containing all five time perspectives.

30.1.2. Past- Positive TP

Apart from this ability and positive future outlook that may be beneficial in fighting depression (Juhl et al., 2010), healthy participants compared to bipolar adults also benefit from significantly higher past-positive time perspective. This TP is associated with a warm and nostalgic recall and focus on the past, consistently positively correlated to positive affect (Tov, 2004) and higher life satisfaction (Boniwell et al., 2010). Previous research revealed that nostalgia can buffer depression (Juhl et al., 2010; Routledge et al., 2008) and is related positively to measures of happiness and well-being (Bryant et al., 2005). Using the past-positive time perspective also appears to be a strategy that is being used in times when mood is low in healthy individuals (Wildschut et al., 2006). Furthermore, past-positive TP also appears to be consistently linked negatively to symptoms of mania, such as reckless behaviour and irritability (Zimbardo & Boyd, 1999). Though no cause-and-effect assumptions can be made in this relationship, the available convergent evidence suggests that past-positive TP may not only buffer depression but also (hypo-)manic symptoms. These two time perspectives are the two temporal orientations that have been associated most consistently with positive long-term outcomes. A future TP is linked to skills and approaches that are needed to attain

future rewards and minimize the risk of negative, damaging outcomes and a past-positive outlook is a strategy to cope with stressful or difficult circumstances. Together, these should underpin healthy functioning, which appears to be the case in the three samples in the current study.

30.1.3. Past-Negative TP

Past Negative TP was highest in mixed mood in bipolar disorder, which is in line with the conceptual overlap and evidence past-negative outlooks to maladaptive functioning including depression (Zimbardo &Boyd, 1999). A past-negative TP has also been linked to negative outcomes such as anxiety and unhappiness (Zimbardo & Boyd, 1999), negative affect (Tov, 2004) and low life satisfaction (Boniwell et al., 2010; Drake et al., 2008; Foret et al., 2004; Zhang & Howell, 2010, 2011) in previous research. The past-negative time perspective in general is perhaps most consistently linked to negative outcomes associated with the illness. For example, it is known to predict suicidal ideation (Laghi et al., 2009), aggression and depression and it also is correlated negatively with impulse control (Zimbardo & Boyd, 1999) and positively with neuroticism (van Beek et al., 2010). Furthermore, rumination has been linked to this time perspective, which is in turn strongly associated with the development, severity and maintenance of depressive symptoms (Lyumbowski & Nolen-Hoeksema, 1998, 2005). Zhang and Howell (2011) found that past negative TP showed the strongest (negative) relationship with general life satisfaction among any of the variables in their study. Outcomes in depression, such as suicidality, is also linked to past-negative biases (Laghi, 2009). Given the consistent evidence, past-negative was expected to be a strong predictor of depression in bipolar disorder.

30.1.4. Present TP

Also significantly higher in bipolar adults compared to normal controls is a fatalistic attitude towards the present and a present-hedonistic TP. The latter is not negative per se. It is the preference for immediate or current enjoyment and reward and is associated with a 'happy-go-lucky' attitude and higher scores in openness and friendliness (Zimbardo & Boyd, 1999). These individuals often have higher energy levels and report having more interpersonal relationships than future-oriented individuals (Zimbardo & Boyd, 1999). However, the short-

term enjoyment and disregard for consequences comes at the considerable cost of a risk for painful consequences of ones' actions (Rothspan & Read, 1996; Zimbardo, Keough & Boyd, 1997), as well as impulsiveness and poor self-control that may lead to unhealthy behaviours and habits (Daugherty & Brase, 2010; Wills, Sandy & Yager, 2001; Apostolidis et al., 2006) and other adverse consequences. Interestingly, healthy participants scored lower in this time perspective and there was less deviation around this low mean than in bipolar adults.

Present time perspective is particularly interesting in that it appears to be both conductive and detrimental to well-being. Some authors argue that the ability to focus on the present is a necessary requirement for well-being (e.g. Boyd-Wilson et al., 2002) which is in line with techniques like mindfulness and meditation that aim to promote a focus on the present moment. However, arguably such techniques are often used when there is an extreme future-focus, for example in the form of worry or uneasiness. Temporal theory would, in such cases, assume that other time perspectives, such as the present, need to be strengthened to re-establish a balance. A higher present-hedonistic TP furthermore is correlated with higher positive affect (Zimbardo & Boyd, 1999). However, a present orientation also appears to be related to a range of negative outcomes, which are perhaps due to the carefree attitude inherent to this perspective which lacks concern for consequences. What counts to present-hedonistic individuals is present enjoyment rather than cautious weighing of future cost and benefits. Health problems, taste over nutrition food choices, addictions, dangerous driving and promiscuity have all been linked to present-TP's (Keough et al., 1999; Zimbardo & Boyd, 1999; Rothspan & Read, 1996).

An interesting insight into how present-orientation is also connected to both external circumstances (like the stressful environment at the SPE) and negatively to well-being is given in an interview study by Beiser. In 1987, he investigated the psychological mechanisms underpinning how people deal with extreme stress, such as becoming refugees. In his study, he interviewed adults in a refugee camp in Thailand. He found that this population was extremely present-oriented and that a past-orientation was associated with elevated depression scores. Beiser called this preoccupation with the past a 'nostalgic' orientation, which differs from today's standpoint of time orientation that differentiates between past-positive and past-negative TP, the former being nostalgia which we know to be an effective tool in fighting depression (Wildschut et al., 2006; Juhl et al., 2010). Only past-negative TP is associated with depression, anxiety and unhappiness (Bryant et al., 2005; Zimbardo & Boyd, 1999; Foret et al., 2004). Beiser (1987) noted a distinctly low future orientation in this refugee population which appeared to have developed as a coping and protective mechanism (i.e. focusing on the present only, trying not to be too optimistic about the future and splitting from a painful past).

A similar mechanism could be contributing to the results obtained in the present study which found a lower future orientation in bipolar patients compared to healthy adults, especially when in depressive phases. More importantly, there also seems to be an important connection to the observations made at Stanford Prison is that participants in both the SPE and Beiser's (1987) interview study developed a strong present-focus in response to being exposed to tremendous external stress. The present time perspective hence appears to be connected to maladaptive functioning and depression in both previous literature, as well as in the present PhD research studies. Bipolar adults appear to score significantly higher in both present TP's, which is in line with previous observational, qualitative and quantitative evidence.

A last finding of the current study was that present-hedonism also predicted hypomanic personality which is believed to be a marker for risk of developing bipolar disorder in sub-threshold and healthy individuals (i.e. Kwapil et al., 2000). Interestingly, past-negative TP also predicted this type of personality, indicating that both the general tendency for an adverse focus on traumatic and negative past events as well as the preference for immediate reward, pleasure and thrill-seeking appear to be present in hypomanic personalities and can be identified and captured with time perspective.

31. Implications of the Findings

The findings are now discussed in relation to an integrated model of time perspective within bipolar disorder.

31.1. State versus Trait

Within the field of bipolar disorder research, there has been a long-standing debate about whether or not bipolar symptoms are trait or state-specific. One line of evidence has been converging evidence from neuro-imaging, post-mortem, and neuro-psychological studies looking at abnormalities in individuals experiencing acute mood states compared to those in remission, as well as comparing brain abnormalities between adults with bipolar disorder and individuals without the condition post-mortem (Blumberg et al., 2003). Other types of evidence come from performance-comparison experimental and other paradigms studies. The debate is fuelled by findings such as bipolar patients functioning differently to healthy adults, even when they are in remission. For example, a factor that is known to affect euthymic bipolar patients differently than adults without the condition is external life stressors (Krueger et al,

2003). This is one example that suggests that there may be 'trait'-type of differences that are characteristic for patients with bipolar disorder, but not those without it.

Other factors for which there is growing evidence that they are also indicating trait-type of differences include emotional reactivity and mood instability (Fukuda et al., 1983; Tsuang et al., 1979), as well as measurable abnormalities in cognitive functioning (Loeber, 1999 in Krueger, 2003; Videbech, 2000). All of these examples appear to be more prominent in bipolar samples when compared to the general population. (Krueger et al., 2003).

Other aspects of bipolar disorder appear to be specific to the specific state a person is in. For example, the elated, euphoric mood that is often accompanying mania is in contrast to the low mood in depressive phases, although it has to be acknowledged that there can be considerable overlap of symptoms.

The question arises whether time perspective may be a trait or a state-specific variable within bipolar disorder and abnormal mood.

The results of the present research suggest that time perspective is sensitive to mood state. It appears to return to a level that is closer to the ideal TP values (Zimbardo, 2012) when individuals are in remission and they become significantly different from the ideal values when in acute mood phases. The ideal TP values are believed to be conductive to healthy psychological functioning (Boniwell, 2010).

One of the limitations inherent to the concept of time perspective is the argument around TP being a 'state' or a 'trait'; in other words, whether it is stable over time or fluctuates. The answer time perspective theory provides that it is both, but it is unclear how and when TP's fluctuate (Boniwell & Zimbardo, 2010; Zimbardo & Boyd, 1999) that it is assumed to be a learned trait that remains relatively stable over time. Yet, temporal theory is very specific in the consequences stability versus flexibility in TP's has.

Zimbardo explains that TP's are learned and can be shaped by a plethora of factors, such as culture, religion, and other demographics. He goes on to explain that he perceives his own (Italian) culture to be more consistent with a present-orientation than the U.S. Culture that he perceives are more future-oriented. He does not comment on how his TP may have changed, moving from Italy to the United States. Zimbardo & Boyd (1999) posit that the preference for certain TP's are learned and remain relatively stable over time. However, at the same time, a person's TP is assumed to be relatively flexible on a moment-to-moment basis. For example, a predominantly future-oriented person may become more present-oriented if the situation makes such a TP more beneficial and is more in line with the person's short-term goal. This would enable us to relax and enjoy the moment, as opposed to keep working on a project with long-term rewards, for example, or vice versa. It is unclear when a person switches between

dominant TP's but it appears that TP-theory posits that our TP profile needs to remain relatively flexible so that they can respond to situational demands. When it is mostly beneficial to delay rewards, a future TP is more appropriate, and when short-term goals are most important, a present-TP is more beneficial.

If time perspective is related to moods at all, time perspective biases, i.e. extreme scores on any TP, should be related to abnormal mood. Bipolar mood states should thus be predictable with TP biases. If this was the case, this would point at TP being 'state-specific'. The comparison between TP's between healthy individuals and bipolar adults should reveal whether or not TP's may also, to a certain extent, be 'trait'-specific, i.e. there may be a general difference between bipolar adults and healthy participants.

31.2. Clinical Implications

The results of the present research indicate that time perspective alone explains some of the variance in bipolar mood states, yet the proportion of variance is relatively small. Yet, time perspective as a whole was able to differentiate between mood states in bipolar disorder and was also able to statistically predict mood in these participants. The fact that the explained variance is significant, yet not large has to be expected in a phenomenon as complex as (abnormal) mood.

Time perspective is a cognitive individual difference variable. In past research, many other internal and external variables have been identified as contributing to the development of acute episodes, such as dysfunctional attitudes, stressful life events, social support, social- and circadian rhythm. Time Perspective as a cognitive variable is thus only be part of the wider dynamics around the course and development of bipolar disorder. Despite the relatively low amount of variance explained by TP on its own in this study, it may still be a valuable contribution to already existing interventions for bipolar disorder. There are several ways in which TP could be incorporated or guide existing cognitive behavioural therapy (CBT)-interventions. CBT is recommended as treatment for bipolar disorder (Matrix, 2011) and is the theoretical model that most easily accommodates time perspective. The premise of CBT is based on the 4 systems that are believed to be linked: Cognitions, Physiological Response, Affect and Behaviour. CBT is looking to foster change in the systems where appropriate in order to change the others. New links are being learned and maintained with repeated practice. The newly established links should become stronger over time and create a new and healthier response pattern.

Time perspective can be accommodated within the 4-systems model and may complement and expand current techniques used in the treatment of bipolar disorder. As a cognitive variable, TP would fit into the first system. Rather than being a type of cognition, as is often evaluated in CBT, TP offers a way of looking at what is underpinning the relevant cognitions. For example, if a dysfunctional attitude has been identified by therapist and their client as being unhelpful, the goal would ultimately be to challenge it. More specifically, a dysfunctional attitude may be related to perfectionism and the need to achieve. This may, in turn, be underpinned by a high future-orientation. Thus, even though the dysfunctional attitude has been identified, TP may underpin this cognition.

One of the other systems, behaviour, may also be cognitively underpinned by TP. The lack of sleep found in mania is often related to goal-striving and may thus also be related to future-TP. Yet another system, affect, also appears to be underpinned by TP as has been shown to be the case in the present research. In line with the CBT premise, changing TP should lead to a change in mood.

Considering TP instead of just specific types of cognitions has several advantages. First, time perspective theory provides a template for how the change in CBT systems should look like. It posits that a person's temporal profile should ideally be balanced and ideal values are provided (Zimbardo, 2012). TP biases, on the other hand, are detrimental to well-being. This, time perspective as a concept may help focus CBT approaches and provide a direction of change. For example, a strong future-focus may need to be balanced by strengthening past and present-TP. This is the second advantage TP provides: it is a concept that is easily measurable, making it easy to identify biases and where the imbalance lies. It's third advantage is that TP is potentially relatively easy to change. For example, Zimbardo & Boyd (1999) report a diary study in which participants were encouraged to write about positive future scenarios for two weeks on a daily basis. This did foster their future TP. However, it has to be noted that the study above was not published and thus the findings need to be treated with great caution. However, even already established CBT techniques may be understood within the temporal theory-framework. For example, 'grounding techniques' could be seen as a way of strengthening a person's present-focus TP. This is often used when the client is either too future- or past-oriented, and thus the function is to balance the person's (time-)perspective. The opposite is achieved with distancing-techniques and exercises (e.g. STOPP; Mindfulness; Thoughts on Trial; taking an outsider's point of view) that essentially aim for the client to 'unhook' from the immediate experience and broaden their focus, often by thinking about the future and the impact the feared scenario will have in a larger time frame (e.g. What is the worst case scenario? Will this still matter in

10 hours or 10 years from now? While it may have an immediate impact, the effect will be temporary).

Re-scripting techniques could also be understood and used within temporal theory, i.e. as a way to modify a particular past TP-focus by taking the focus off Past Negative TP-biases and either balance it with other TP's or strengthening a past-positive TP.

In summary, time perspective theory may fit with low intensity CBT treatments by identifying maladaptive biases and providing a clearer direction and rationale for subsequent treatment goals. It may also guide treatment and the selection of techniques that the client is taught. Furthermore, an awareness of the connection between mood and TP could be beneficial in itself. It could be used as part of psycho-education and to help foster awareness of how to achieve the 'balance' needed for well-being. The balance may be achieved in many ways the client is already doing. For example, meditation or exercise may be a client's way of dealing with changes in affect when low mood or anxiety is overwhelming. The client may also be taught about the impact a strong orientation to any time frame can have on their well-being, e.g. a strong present-hedonistic attitude may lead to a narrowed focus that could potentially contribute to the development of mood disturbances. Teaching the client to be aware of these links and the fluctuation in mood that accompanies them may in itself be a valuable part of psycho-education.

31.3. Limitations

*Self-report

The most serious limitation of this study was the fact that all collected data is based on self-report and thus the diagnosis of bipolar disorder participants had to confirm at the start of the study is not guaranteed. The main risk that threatens the validity of this study is that the psychiatric diagnoses of bipolar disorder could not be confirmed. Another risk has been identified in Harber et al (2003) who found that self-selected participants had particularly high future TP. The fact that participants volunteered to take part in this study may thus have had an impact on the TP preferences measured in this sample. Various other factors, such as age and culture are also believed to impact on TP preferences. Form the data gathered in the present study, as well as the available literature, it is impossible to establish the impact such variables may have had on the measured TP scores.

A second related issue is the use of the specific self-report measures. The advantage of the approach is the high reliability and validity of the used scales. However, it has to be kept in

mind that there are some issues with the questionnaires themselves, e.g. the lack of a 'negative future' subscale in the ZTPI (1999) and general disagreement among researchers about a potential 6th factor. The scale was used in the present research in order to recruit a large and diverse sample and to contribute to the existing research base on time perspective, which is based almost entirely on the ZTPI.

*Online design

The online design chosen served the purpose of being able to recruit a large sample which was desirable given that time perspective has never been applied to bipolar disorder before. Risks of online self-report studies include the lack of control of whether or not all participants actually fulfilled all inclusion criteria for each study. This, in turn, is a serious threat to external reliability and validity. Some precautions were taken in order to minimise this risk. For example, each questionnaire could only be accessed once per IP address, thereby avoiding the risk of having participants re-enter the survey that were automatically excluded from the study based on the exclusion criteria the first time they filled in the survey. Furthermore, the link to the study was only posted on websites that should attract adults with bipolar disorder. These groups included mental health groups and self-help forums specifically for this target group. However, the risk remains as it can still could not be guaranteed that all participants are formally diagnosed with bipolar disorder.

*Cross-sectional design

The series of studies were cross-sectional designs. They provide a snapshot of the dynamics that may be involved in the relationship between time perspective and mood. However, they are not sufficient on their own and are usually best complemented with other designs, such as longitudinal studies. Especially in the context of bipolar disorder with mood fluctuations being a core feature, this snapshot was precisely what was beneficial for the question of whether or not TP predicts these changes in affect. Nonetheless, other research approaches are needed in order to complement the findings and expand on the available literature. For example, qualitative and longitudinal data could be useful to examine how stable time perspective's influence on functioning really is, whether TP preferences are not only state-specific but are, as time perspective theory assumes, also relatively stable over time.

*Use of qualitative date

Additional information was collected from some participants, but not all, in terms of how they experience time perspective. These were drawn from comments participants chose to leave. The analysis would have benefitted from targeted questions that all participants would have been asked specifically. Given the lack of a clear methodological approach to collecting the data, these were later only analysed for illustration purposes, as opposed to them being approached with the appropriate data analysis methodology, such as IPA, mainly due to minimal data.

*Length of the study

A further related problem was the length the studies took to complete (approx. 40 mins). Several self-report measures were used in the same study and some participants commented on their lack of ability to concentrate for long enough to finish them. A few participants also commented on not being clear on the instructions given for the ZTPI and were wondering for which context or mood they should refer to when answering (i.e. occupational versus private setting). The confusion about the instructions may have caused inconsistent results and threatened the reliability of the results. Two measures were removed due to unusual patterns of responses.

*Data analysis

A further issue with the design of the studies in this PhD is that they do not explore the possibility of time perspective interactions with other variables that could mediate or moderate relationships. It is likely that the combination of certain time perspectives, as cognitive variables, along with other external events variables, have the most accurate predictive relationship with bipolar mood states. Some measures were used to collect data and made the time it took to complete the study longer, yet they were not ultimately used in the analysis. This led to missing out on potentially valuable data, i.e. a model to increase the predictive power of time perspective in the context of bipolar disorder.

*Sample qualities

The recruited samples for this study were deliberately diverse in that they included all types of bipolar disorder, a wide age-range, and variety of cultures as well as medicated and non-medicated participants. However, these variables that were uncontrolled for may have had an impact on the temporal preferences that were measured. Many further variables are known to influence TP's. Medication levels potentially alters temporal orientation as was suggested by

one of the participants in the qualitative part of the study. It is possible that the severity and type of the disorder may also alter time perspective; for example, a more fatalistic attitude may be due to long or severe courses of the illness. Future studies should consider controlling these issues.

The samples were pre-dominantly female, which Sircova et al (2007) have identified to impact on TP preferences. It is thus possible that the results obtained are skewed. This was examined statistically and found not to be the case. However, other potential confounding factors, such as 'culture' were more difficult to examine given the data that was collected (i.e. country of permanent residence as opposed to where participants have lived for most of their lives or the culture they identify with the most, for example).

*Mood measures lacking for healthy participants

Given that there was no mood measure used for healthy participants, it is unclear whether or not they could have suffered from mental health difficulties or abnormal mood, despite the fact that they do not have an official mental health diagnosis. Participants were screened with the question of whether or not they have a mental health diagnosis, yet this means it is uncertain whether or not they, too, may have experienced abnormal mood symptoms at the time of participation. This would have threatened the internal validity of the study and could have skewed the results.

*Missing Data

A lot of the collected data in the pilot study was lost due to missing data, which, in turn, was due to the way the data were first collected online. The approach was later changed so that no missing data were allowed.

*Confounding variables

Time perspective is believed to be influenced by various demographic factors, such as gender and culture. The samples collected for this study were biased in that the majority of participants were female, for example, and almost all participants lived in Western cultures. These are just two of the factors that may have had an impact on the results obtained in this study. This is a threat to the external reliability of this study and findings should hence be treated with the demographic spread in mind.

VI. Conclusions

In summary, the ten research questions provided first insight on the relationship of time perspective to bipolar mania, depression, mixed moods and euthymia. TP scores in the current research are indeed different between healthy adults and adults currently experiencing mood symptoms. When in remission, time perspective appears to be similar to that of healthy adults, suggesting that the abnormal moods specifically are closely linked to time perspective and may change considerably, given the finding that TP underpins mood states differentially. Moreover, time perspective scores in bipolar disorder in general appear to be considerably different from what is believed to be ideal for positive psychological functioning. Thus, this might be a target for time perspective interventions. The past-negative and present-hedonistic TP appear to be the most relevant to bipolar disorder. Present-hedonistic TP shares commonality with mania and predicted these mood states in this research, as well as hypomanic personality. Depression, as well as hypomanic personality, was most prominently predicted by the past-negative TP.

Despite positive results in the sense that time perspective does appear to underpin mood states (healthy vs. abnormal, as well as mania, depression, mixed mood and euthymia within bipolar disorder) differentially, and can also predict mood states. However, as discussed at the beginning of this chapter, the possibility that the concept of TP may be too broad of a concept to really be of clinical utility in practice appears to be the case in the present research. The correct classifications in terms of mood state group membership were relatively low, as was the amount of variance explained. Though statistically significant, these values were both not satisfactory enough to be of practical value in the context of bipolar disorder. However, bipolar disorder and the development of acute mood episodes is result of various factors including genetics, personality, life events as well as cognitive variables. It is thus possible that TP as a cognitive variable may be a valuable contributor to a predictive model including all of these factors.

41. Directions for future research

This PhD research established that time perspective does indeed statistically underpin mood states in bipolar disorder and can predict acute mood episodes as well as euthymia. However, given the relatively low effects found in the present research, it is unlikely that time perspective cognitive re-mediation alone can change mood regulation enough to make a noticeable and

long-term impact. At the same time, it is not surprising that time perspective as a cognitive variable is only one determinant of extreme mood phases. Bipolar disorder is complex in its presentation and onset of acute moods is determined by various factors, such as age, severity of previous episodes, external stressors, interpersonal support and more. Future research should aim to expand on the findings of the current by adding other variables that are likely to moderate or mediate the effects time perspective has on moods. A statistical model to predict mood states is likely to become more accurate when more of these variables are considered together.

Another aspect future research should consider is the methodology that is being used. A concern in the available research to date is that nearly all of them are cross-sectional self-report studies, due to the fact that the main instrument that measures TP, the ZTPI, is a self-report scale. However, research could benefit from additional qualitative studies and longitudinal designs. The latter could, for instance, investigate another question that has not yet been established in research, i.e. how stable time perspective is over time, especially in bipolar disorder.

In order to be of value for practice, time perspective should also be investigated as part of interventions designed for bipolar disorder self-management. As suggested in Zimbardo & Boyd (1999), time perspective may be altered with simple interventions such as diary-writing tasks. An intervention designed to alter past, present or future time perspectives could be investigated in the future where short-and long-term benefits of changing time perspectives to a more ideal, balanced profile could be tested.

The present research was a first investigation into time perspective and psychopathology in bipolar disorder. Future studies may extend the findings also by examining time perspective's predictive utility in other disorders such as unipolar depression. However, other disorders may also be underpinned by strong time perspective biases. Examples could be post-traumatic stress disorder that should be underpinned by strong past-negative biases. OCD may be understood in terms of a strong present TP-bias and anxiety as a future TP bias.

The next step in research, however, should be to expand on the findings of this PhD by building a more comprehensive model of bipolar disorder that includes time perspective, but also other known influences in the development of acute mood episodes. These efforts could have important implications for our understanding of bipolar disorder and the management of this condition in the future.

ii. List of References

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i. Appendix

I. List of Tables and figures

II. Material

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- Zimbardo Time Perspective Inventory (ZTPI; Zimbardo& Boyd, 1999)
- Internal State Scale (ISS; Bauer, 1991)
- Barratt Impulsiveness Scale (BIS-11; Patton, Stanford & Barratt, 1995)
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- Interpersonal evaluation Scale (ISEL-12; Cohen et al., 1985)
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Participant Information Sheet

Thank you for your interest in this research project on Bipolar Disorder. Before you decide whether or not you would like to take part, please take a moment to read the following information.

What is the aim of this study?
The aim of this study is to investigate factors that may predict mania and depression in Bipolar Disorder. We are intending to use the results of this study to develop self-management techniques for relapse prevention.

What kind of questions will be asked?
The questions will relate to memory, social support, aspects of your personality and your attitude to your past, present and future. These items are not expected to upset you in any way but it is important to remember that you may leave the survey at any point.

Why have I been asked to take part?
We are interested in finding a representative sample of any adults between 18 and 60 years who have been diagnosed with Bipolar Disorder, have no learning disabilities and speak fluent English.
It is important to note that you are under no obligation to take part in this research.

How long will it take?
Participation should take about 25-30 minutes.

What happens if I change my mind about taking part?
You are under no pressure to participate in this study. You may quit or withdraw at any point, even after completion of the surveys. No questions will be asked.

What happens to my answers?
Should you decide to take part all information you provide us with will be anonymized and treated confidentially. Your answers will be stored on a password-protected computer and kept there for up to 2 years before they will be safely destroyed. The only people that will have access to all data are the researcher, Melanie Suettmann, and her supervisor, Dr. Matthias Schwannauer.

To withdraw, complain or discuss any issues you have with this research, please contact
M.E.Suettmann@sms.ed.ac.uk or m.schwannauer@ed.ac.uk

Informed Consent Sheet

Please read the following statements and check the box to indicate that you agree.

[ ] I have read and understood the information given on the previous page for the
above study.

[ ] I have no diagnosed learning disability and I am fluent in English.

[ ] I understand that my participation is voluntary and that I am free to withdraw at
any time, without giving a reason.

[ ] I understand that the information obtained from all questionnaires that I complete as part of the research will be anonymous and confidential.

[ ] I have read each of the above statements and I agree to take part in the study.

Print Name of Participant

_____

Signature of Participant

_____

For the person taking the consent only

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered to the best of my ability. I confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily.

A copy of this sheet has been provided to the participant.

Print Name of person taking the consent _____

Signature of person taking the consent _____

Date _____

Participant Number:_____

Zimbardo Time Perspective Inventory

Read each item and, as honestly as you can, answer the question: "How characteristic or true is this of you?" Check the appropriate box using the scale. Please answer ALL of the following questions on both sides.

1= Very untrue

2= Untrue

3= Neural

4=True

5= Very true

	1	2	3	4	5
1. I believe that getting together with one's friends to party is one of life's important pleasures.					
2. Familiar childhood sights, sounds, smells often bring back a flood of wonderful memories.					
3. Fate determines much in my life.					
4. I often think of what I should have done differently in my life.					
5. My decisions are mostly influenced by people and things around me.					
6. I believe that a person's day should be planned ahead each morning.					
7. It gives me pleasure to think about my past.					
8. I do things impulsively.					
9. If things don't get done on time, I don't worry about it.					
10. When I want to achieve something, I set goals and consider specific means for reaching those goals.					
11. On balance, there is much more good to recall than bad in my past.					
12. When listening to my favourite music, I often lose all track of time.					

13. Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play.					
14. Since whatever will be will be, it doesn't really matter what I do.					
15. I enjoy stories about how things used to be in the "good old times."					
16. Painful past experiences keep being replayed in my mind.					
17. I try to live my life as fully as possible, one day at a time.					
18. It upsets me to be late for appointments.					
19. Ideally, I would live each day as if it were my last.					
20. Happy memories of good times spring readily to mind.					
21. I meet my obligations to friends and authorities on time.					
22. I've taken my share of abuse and rejection in the past.					
23. I make decisions on the spur of the moment.					
24. I take each day as it is rather than try to plan it out.					
25. The past has too many unpleasant memories that I prefer not to think about.					
26. It is important to put excitement in my life.					
27. I've made mistakes in the past that I wish I could undo.					
28. I feel that it's more important to enjoy what you're doing than to get work done on time.					
29. I get nostalgic about my childhood.					
30. Before making a decision, I weigh the costs against the benefits.					

	1	2	3	4	5
31. Taking risks keeps my life from becoming boring.					
32. It is more important for me to enjoy life's journey than to focus only on the destination.					
33. Things rarely work out as I expected.					
34. It's hard for me to forget unpleasant images of my youth.					
35. It takes joy out of the process and flow of my activities, if I have to think about goals, outcomes, and products.					
36. Even when I am enjoying the present, I am drawn back to comparisons with similar past experiences.					

37. You can't really plan for the future because things change so much.					
38. My life path is controlled by forces I cannot influence.					
39. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.					
40. I complete projects on time by making steady progress.					
41. I find myself tuning out when family members talk about the way things used to be.					
42. I take risks to put excitement in my life.					
43. I make lists of things to do.					
44. I often follow my heart more than my head.					
45. I am able to resist temptations when I know that there is work to be done.					
46. I find myself getting swept up in the excitement of the moment.					
47. Life today is too complicated; I would prefer the simpler life of the past.					
48. I prefer friends who are spontaneous rather than predictable.					
49. I like family rituals and traditions that are regularly repeated.					
50. I think about the bad things that have happened to me in the past.					
51. I keep working at difficult, uninteresting tasks if they will help me get ahead.					
52. Spending what I earn on pleasures today is better than saving for tomorrow's security.					
53. Often luck pays off better than hard work.					
54. I think about the good things that I have missed out on in my life.					
55. I like my close relationships to be passionate.					
56. There will always be time to catch up on my work.					

10-Item Self-Scoring Self-Control Scale

Adapted from

Tangney, J.P., Baumeister, R.F., Boone, A.L. (2004). High Self-Control Predicts Good Adjustment, Less Pathology, Better Grades, and Interpersonal Success. Journal of Personality, 271-324.

First, please read the following 10 statements and for each, check the box that best represents you.

	Not at all like me	A little like me	Some what like me	Mostly Like Me	Very much like me
I have a hard time breaking bad habits.	5	4	3	2	1
I get distracted easily.	5	4	3	2	1
I say inappropriate things.	5	4	3	2	1
I refuse things that are bad for me, even if they are fun.	1	2	3	4	5
I'm good at resisting temptation.	1	2	3	4	5

People would say that I have very strong self-discipline.	1	2	3	4	5
Pleasure and fun sometimes keep me from getting work done.	5	4	3	2	1
I do things that feel good in the moment but regret later on.	5	4	3	2	1
Sometimes I can't stop myself from doing something, even if I know it is wrong.	5	4	3	2	1
I often act without thinking through all the alternatives.	5	4	3	2	1

Internal State Scale

Please rate how you have been feeling in the past 24 hours.

0= Not true at all

10= Extremely true for me

	0	1	2	3	4	5	6	7	8	9	
Today my mood is changeable.											
Today I feel irritable.											
Today I feel like a capable person.											
Today I feel like people are out to get me.											
Today I actually feel great inside.											
Today I feel impulsive.											
Today I feel depressed.											
Today my thoughts are going fast.											

Today it seems like nothing will ever work out for me.										
Today I feel overactive.										
Today I feel as if the world is against me										
Today I feel "sped up" inside.										
Today I feel restless.										
Today I feel argumentative.										
Today I feel energized.										

BIS/BAS

Each item of this questionnaire is a statement that a person may either agree with or disagree with. For each item, indicate how much you agree or disagree with what the item says. Please respond to all the items; do not leave any blank. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

1 = very true for me
2 = somewhat true for me
3 = somewhat false for me
4 = very false for me

	1 = very true for me	2 = somewhat true for me	3 = somewhat false for me	4 = very false for me
1. A person's family is the most important thing in life.				

2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.				
3. I go out of my way to get things I want				
4. When I'm doing well at something I love to keep at it.				
5. I'm always willing to try something new if I think it will be fun.				
6. How I dress is important to me.				
7. When I get something I want, I feel excited and energized				
8. Criticism or scolding hurts me quite a bit.				
9. When I want something I usually go all-out to get it.				
10. I will often do things for no other reason than that they might be fun.				
11. It's hard for me to find the time to do things such as get a haircut.				
12. If I see a chance to get something I want I move on it right away.				
13. I feel pretty worried or upset when I think or know somebody is angry at me.				
14. When I see an opportunity for something I like I get excited right away.				
15. I often act on the spur of the moment.				
16. If I think something unpleasant is going to happen I usually get pretty "worked up."				
17. I often wonder why people act the way they do.				
18. When good things happen to me, it affects me strongly.				
19. I feel worried when I think I have done poorly at something important.				
20. I crave excitement and new sensations.				
21. When I go after something I use a "no holds barred" approach.				
22. I have very few fears compared to my friends				
23. It would excite me to win a contest.				

24. I worry about making mistakes.				

Barratt Impulsiveness Scale (BIS-11)

DIRECTIONS: People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and circle the number that is most appropriate on the right side of this page. Do not spend too much time on any statement. Answer quickly and honestly.

1	2	3	4
Rarely/Never	Occasionally	Often	Almost Always/Always

1 I plan tasks carefully.	**1**	**2**	**3**	**4**
2 I do things without thinking.	**1**	**2**	**3**	**4**
3 I make-up my mind quickly.	**1**	**2**	**3**	**4**
4 I am happy-go-lucky.	**1**	**2**	**3**	**4**
5 I don't "pay attention."	**1**	**2**	**3**	**4**
6 I have "racing" thoughts.	**1**	**2**	**3**	**4**
7 I plan trips well ahead of time.	**1**	**2**	**3**	**4**
8 I am self controlled.	**1**	**2**	**3**	**4**
9 I concentrate easily.	**1**	**2**	**3**	**4**
10 I save regularly.	**1**	**2**	**3**	**4**
11 I "squirm" at plays or lectures.	**1**	**2**	**3**	**4**
12 I am a careful thinker.	**1**	**2**	**3**	**4**
13 I plan for job security.	**1**	**2**	**3**	**4**
14 I say things without thinking.	**1**	**2**	**3**	**4**
15 I like to think about complex problems.	**1**	**2**	**3**	**4**
16 I change jobs.	**1**	**2**	**3**	**4**
17 I act "on impulse."	**1**	**2**	**3**	**4**
18 I get easily bored when solving thought problems.	**1**	**2**	**3**	**4**

19 I act on the spur of the moment.	**1**	**2**	**3**	**4**
20 I am a steady thinker.	**1**	**2**	**3**	**4**
21 I change residences.	**1**	**2**	**3**	**4**
22 I buy things on impulse.	**1**	**2**	**3**	**4**
23 I can only think about one thing at a time.	**1**	**2**	**3**	**4**
24 I change hobbies.	**1**	**2**	**3**	**4**
25 I spend or charge more than I earn.	**1**	**2**	**3**	**4**
26 I often have extraneous thoughts when thinking.	**1**	**2**	**3**	**4**
27 I am more interested in the present than the future.	**1**	**2**	**3**	**4**
28 I am restless at the theatre or lectures.	**1**	**2**	**3**	**4**
29 I like puzzles.	**1**	**2**	**3**	**4**
30 I am future oriented.	**1**	**2**	**3**	**4**

Interpersonal Support Evaluation List (ISEL)

This scale is made up of a list of statements each of which may or may not be true about you. For each statement check "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should check "definitely false" if you are sure the statement is false and "probably false" is you think it is false but are not absolutely certain.

1. There are several people that I trust to help solve my problems.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

2. If I needed help fixing an appliance or repairing my car, there is someone who would help me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

3. Most of my friends are more interesting than I am.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

4. There is someone who takes pride in my accomplishments.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

5. When I feel lonely, there are several people I can talk to.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

6. There is no one that I feel comfortable to talking about intimate personal problems.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

7. I often meet or talk with family or friends.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

8. Most people I know think highly of me.
____definitely true (3) ____definitely false (0)

____probably true (2) ____probably false (1)

9. If I needed a ride to the airport very early in the morning, I would have a hard time finding someone to take me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

10. I feel like I'm not always included by my circle of friends.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

11. There really is no one who can give me an objective view of how I'm handling my problems.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

12. There are several different people I enjoy spending time with.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

13. I think that my friends feel that I'm not very good at helping them solve their problems.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

14. If I were sick and needed someone (friend, family member, or acquaintance) to take me to the doctor, I would have trouble finding someone.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

15. If I wanted to go on a trip for a day (e.g., to the mountains, beach, or country), I would have a hard time finding someone to go with me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

16. If I needed a place to stay for a week because of an emergency (for example, water or electricity out in my apartment or house), I could easily find someone who would put me up.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

17. I feel that there is no one I can share my most private worries and fears with.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

18. If I were sick, I could easily find someone to help me with my daily chores.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

19. There is someone I can turn to for advice about handling problems with my family.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

20. I am as good at doing things as most other people are.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

21. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

22. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

23. If I needed an emergency loan of $100, there is someone (friend, relative, or acquaintance) I could get it from.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

24. In general, people do not have much confidence in me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

25. Most people I know do not enjoy the same things that I do.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

26. There is someone I could turn to for advice about making career plans or changing my job.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

27. I don't often get invited to do things with others.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

28. Most of my friends are more successful at making changes in their lives than I am.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

29. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.).
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

30. There really is no one I can trust to give me good financial advice.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

31. If I wanted to have lunch with someone, I could easily find someone to join me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

32. I am more satisfied with my life than most people are with theirs.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

33. If I was stranded 10 miles from home, there is someone I could call who would come and get me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

34. No one I know would throw a birthday party for me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

35. It would me difficult to find someone who would lend me their car for a few hours.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

36. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

37. I am closer to my friends than most other people are to theirs.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

38. There is at least one person I know whose advice I really trust.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

39. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

40. I have a hard time keeping pace with my friends.
____definitely true (3) ____definitely false (0)
____probably true (2) ____probably false (1)

Hypomanic Personality Scale (HPS-20)

Please read the following statements and indicate whether they are true or untrue for you!

	True=1	Not true = 0
1. A hundred years after I'm dead, my achievements will probably have been forgotten		
2. I am so good at controlling others that sometimes it scares me		
3. I am frequently in such high spirits that I can't concentrate on any one thing for too long		

4. I am considered to be a kind of 'hyper' person		
5. I often have moods where I feel so energetic and optimistic that I feel I could outperform almost anyone at anything		
6. In unfamiliar surroundings I am often so assertive and sociable that I surprise myself		
7. I like to have others think of me as a normal kind of person		
8. I am usually in an average sort of mood, not too high and not too low		
9. I often go into moods where I feel like many of the rules of life don't apply to me		
10. I very frequently get into moods where I wish I could be everywhere and do everything at once		
11. I have often felt happy and irritable at the same time		
12. Sometimes ideas and insights come to me so fast I cannot express them all		
13. I seem to have an uncommon ability to persuade and inspire others		

14. I frequently find that my thoughts are racing		
15. There are times when I am so restless that it is impossible for me to sit still		
16. When I feel an emotion, I usually feel it with extreme intensity		
17. Many people would consider me to be amusing but kind of eccentric		
18. I seem to be a person whose mood goes up and down easily		
19. I often feel excited and happy for no apparent reason		
20. I do most of my work during brief periods pf intense inspiration		

SCHOOL *of* HEALTH IN SOCIAL SCIENCE
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30 September 2015

Dear Melanie,

Application for Level 2/3 Approval

Project Title: Time perspective in the manic versus depressive stages in Bipolar Personality Disorder – Testing the Zimbardo Time Perspective Scare (ZTPI, 1997) in a mental health setting

Academic Supervisor: Matthias Schwannauer

Thank you for submitting the above research project for review by the Department of Clinical and Health Psychology Ethics Research Panel. I can confirm that the submission was independently reviewed and was approved.

Should there be any change to the research protocol it is important that you alert us to this as this may necessitate further review.

Yours sincerely,

Kirsty Gardner

Administrator
Clinical Psychology

Lothian NHS Board

South East Scotland Research
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27 April 2011

Miss Melanie Elisa Suettmann
7 Marchmont Street
Flat 4
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Dear Miss Suettmann

Study title: **Time Perspective in the Manic versus the Depressive Stages in Bipolar Personality Disorder- Testing the Zimbardo Time Perspective Scale (ZTPI, 1997) in a mental health setting**
REC reference: **11/AL/0124**
Protocol number: **-**

Thank you for your letter of 23 April 2011, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered by the chair and vice chair on behalf of SESREC 3.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.